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A STUDY OF THE RELATIONSHIP BETWEEN STUDENT
ATTITUDE TOWARD SCIENCE AND USE OF
THE CHEMISTRY HELP ROOM AND THE
PHYSICS ACTIVITIES CENTER

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by 349 5839

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Chapter 1

INTRODUCTION

In recent years there has been an increased trend in education toward individualization of instruction at the elementary and secondary school level. This is reflected in the new curricula designed for individually paced progress and the numbers of schools utilizing modular scheduling which is particularly adaptable to individualized programs. Many of the new curricula in science are designed to be used by the student in a self-paced program.

In contrast to procedures used in elementary and secondary schools, college science education, particularly in large universities, has been organized around a large lecture format. This format does not allow even the most conscientious instructor to interact on a one-to-one basis with a large portion of his students. As a consequence of this situation, the student is a passive observer rather than an active participant of lectures and demonstrations.

The Chemistry and Physics Departments at Kansas State University operate facilities designed to provide more personal involvement and individual attention for the student. The Chemistry Help Room is open about 40 hours a

week to any student in an introductory chemistry course. The Help Room has been in operation about five years, and was organized specifically to offer the student an opportunity to get the one-to-one assistance in his study of chemistry that is normally unavailable in the large lecture class. The room has study tables, and is staffed by a Teaching Assistant who is there to offer assistance to students. Materials available to students are problem sets, old examinations, laboratory exercises, work books, programmed study aids, supplemental texts and a few film loops and projectors. The purpose of the room is "to provide a place, a person and the materials so the serious student can readily obtain assistance in his study of chemistry."¹

The Physics Activities Center is open about 15 hours a week to any interested student. The Activities Center has been in operation one year. The Center was patterned after the Exploratorium in San Francisco.² It is a place where the student could become actively involved with physics. The room contains an electronic calculator, five carrells which contain film loop projectors and/or optics related experiments, and several other "activities" set up in other parts of the room. The room is staffed by a graduate or upper-level undergraduate student. Available to the student is a large library of 8-mm film loops, a selection of activities that may include experiments and apparatus related to topics under discussion in the classroom and laboratory, lecture demonstrations that have been used in recent lectures, and

other activities designed to attract students. Each activity is accompanied by an explanation of the physical principles involved. The purpose of the Activities Center is to make physics more interesting and fun by allowing the student to get his hands on whatever he wants and to show him how physics is related to the real world and not just the classroom.³

Although the original intentions of the Chemistry Help Room and the Physics Activities Center are different, they both offer an opportunity for more personal involvement by the student, and for more personal contact between the student and somebody in science. The increase in individual attention afforded by these facilities could affect the attitudes of students toward science.

The purpose of this study was to examine whether or not there is a relationship between the attitude of the student toward the area of science he is studying, and use of these supplementary facilities.

STATEMENT OF PROBLEM

Is there a difference in student attitude toward chemistry and physics between those students who use the resource centers and those who do not?

Is there a difference in grade expectations in chemistry and physics between those students who use the resource centers and those who do not?

What differences are there between the way the chemistry students and the physics students responded to the questionnaire?

LIMITATIONS OF STUDY

This study does not attempt to determine the origin of the students' attitudes toward science, or whether the use of the Help Room and Activities Center alters a student's attitude. It does, however, attempt to examine the attitudes of users vs. non-users and their perceptions about the effect of the Help Room and Activities Center upon their attitudes.

This study attempts to determine whether those students who use the Help Room and Activities Center have different attitudes toward Chemistry and Physics than those who do not. It also attempts to determine whether Help Room and Activities Center users expect different grades in chemistry and physics than non-users.

The focus of the Chemistry Help Room appears to be on assignments while the focus of the Activities Center appears to be on exposure to concepts and physics activities. Therefore this study also attempts to see if there is a difference between Chemistry Help Room users and Physics Activities Center users in the way they responded to questions on the questionnaire.

The chemistry students surveyed in this study were

given questionnaires during a lecture period where attendance was not required. Therefore, only those students attending lecture on that day were surveyed. Attendance was required of most physics lab students on the day the questionnaires were distributed. Not all introductory physics students, however, are enrolled in laboratory. Further, use of the Activities Center is not limited to introductory physics students. Therefore, those students responding do not necessarily include all those who use the Help Room and Activities Center.

Among the sixteen questions the chemistry students responded to on their questionnaire, were seven items of the semantic differential type. Because of limitations imposed by the Physics Department, the seven semantic differential items were not included on the questionnaire distributed to physics students.

Chapter 2

LITERATURE SURVEY

DEFINITION OF "ATTITUDE"

The term "attitude" as it appears in the literature on science education has been used in several ways. It has been used to indicate feelings toward science, toward scientists, and it has been used as another term for adherence to or knowledge of the "scientific method."⁴ Dutton and Stephens in a study of elementary science teachers defined "attitude" as "how an individual feels about elementary school science -- an emotionalized feeling for or against science."⁵

"Attitude" as used in this paper refers to the positive or negative emotional feelings of an individual toward a field of scientific study.

Shaw and Wright extracted commonalities of several definitions of attitude and concluded that an attitude is "a relatively enduring system of evaluative, affective reactions based upon and reflecting the evaluative concepts and beliefs which have been learned about the characteristics of a social object or a class of social objects."⁶ Gallagher and Korth point out that two aspects of this definition are

that 1. attitudes are enduring, and 2. attitudes are learned.⁷ If indeed attitudes are enduring and learned, the development of positive feelings toward science is a justifiable concern of the science educator.

RECENT RESEARCH ON ATTITUDES TOWARD SCIENCE

Concern about attitudes toward science is reflected in the literature. Myers used a 44-item Thurstone scale of attitudes toward science and scientists⁸ and "observed no relation between college students' attitudes toward science and their high school backgrounds in science although attitude was correlated positively with final exam grades and final course grades in introductory college chemistry."⁹ Snow and Cohen used the Remmers and Kelley "Scale to Measure Attitudes Towards any Institution" to assess attitudes of college students. They found that graduate and undergraduate physical science students had highly positive attitudes toward the physical and life sciences, however, they had less favorable attitudes toward the social sciences and the humanities.¹⁰ Schwirian and Thomson studied the change in attitudes toward science and the scientific institution which had occurred among undergraduate university students between 1967 and 1971. They found that the 1971 students are no less positive in their attitudes than the 1967 students.¹¹ Brown and Elliot examined in what ways selected characteristics and attitudes

of students enrolled in introductory physics at California Polytechnic State University were related to their perception of the study of physics.¹² Rothman studied the degree to which a science-related semantic differential instrument predicts achievement in a freshman physics and a freshman chemistry course at the State University of New York at Buffalo.¹³ They found that "individual profile scores and profile classification indices derived from the semantic differential . . . were independent of an achievement aptitude measure and thus measured a trait different than achievement aptitude."¹⁴

AFFECTIVE BEHAVIORS IN STUDENT UTILIZATION OF CENTERS

Student utilization of centers such as the Help Room and Activities Center involve certain affective behaviors. The first category, or classification of affective behaviors proposed by Krathwohl, Bloom, and Masia is that of Receiving.¹⁵ This category is subdivided into three different levels: 1.1 Awareness, 1.2 Willingness to Receive, and 1.3 Controlled or Selected Attention. Since the Help Room and Activities Center are facilities provided for the students outside of the formal framework of the classroom, the fact of a student's presence in either center indicates a behavior of at least 1.2 or 1.3. Once the student is inside the center, if he asks a question, performs an activity, or uses

any supplementary materials provided for him by the center, his behavior is characteristic of affective behaviors of the second category, Responding. The level to which the student responds, that is: 2.1 Acquiescence in Responding, 2.2 Willingness to Respond, or 2.3 Satisfaction in Response, depends upon the quality of the experience that takes place, and upon the attitude or expectations of the experience the student brings with him. The development of Values, the third category of affective behaviors, could be influenced by the sum of the student's experiences during center visits. Thus affective behaviors are an integral part of the use of the Help Room and Activities Center. Further, the experiences of center visits will combine with those that take place during all other aspects of the course and will eventually contribute to the Organization and Characterization of Values, which are the fourth and fifth categories of affective behaviors.

OTHER SCIENCE CENTERS

Curtiss et al discuss the use of a science activities center for stimulating positive attitudes and interests among elementary school children.¹⁶ The Science Teacher Education Center at Antioch College is a place where students in education can investigate a career in science teaching while learning about modern materials and programs in science education. At the same time, elementary school

students learn through performing science and math activities. Activities at the center are known to interest children with "'short attention spans'."¹⁷ The Exploratorium in San Francisco and the Museum of Science and Industry in Chicago are museums offering science activities that continue to interest a large number of patrons.¹⁸

It could, therefore, be reasonable to suggest that centers such as the Chemistry Help Room and the Physics Activities Center might affect the attitudes of college students toward science. Thus, those students who use these facilities may have different attitudes than those who do not.

Chapter 3

PROCEDURE

SPECIFIC QUESTIONS RESEARCHED IN THIS STUDY

The specific questions which were investigated in this study were:

1. Is there a significant difference in attitude between chemistry Help Room users and non-users?
2. Is there a significant difference in attitude among users of the chemistry Help Room according to frequency of Help Room visits?
3. Is there a significant correlation between:
 - a. grade expected by users and frequency of center visits?
 - b. grade expected by users and feelings that visits to the center affected subject's grade?
 - c. frequency of center visits and feelings center visits affected subject's grade?
 - d. frequency of center visits and having more positive feelings toward science as a result of visiting the center?
 - e. having a strong desire to take science and more positive feelings toward science as a result of

taking this course?

- f. grade expected in science and whether or not the subjects used the center?

4. Is there a significant difference between chemistry users and non-users on:

- a. grade expected in chemistry?
- b. whether or not they had a strong desire to take chemistry?
- c. whether they have positive feelings toward chemistry as a result of taking this course?
- d. what they feel is the major purpose of the Help Room?

5. Is there a significant difference between chemistry subjects and physics subjects on:

- a. the grades they expect?
- b. whether or not they use the centers?
- c. whether they had a strong desire to take the course?
- d. whether they have more positive feelings toward science as a result of taking this course?
- e. what they felt to be the major purpose of the center?

6. Is there a significant difference between chemistry users and physics users on:

- a. how often they visit the center?
- b. how they felt visits to the center affect their

grade?

- c. having more positive feelings as a result of visiting the center?

METHOD

A sixteen item multiple response questionnaire was constructed to test the research questions. Included in the questionnaire were seven items of the semantic differential type. Word pairs for these items were chosen after interviewing some members of the Chemistry faculty and some students majoring in Chemistry on their attitudes toward chemistry. The use of the semantic differential technique to measure attitudes toward science has precedence in the literature. Klopfer used the semantic differential technique to assess students' images of science, scientists, and science instruction.¹⁹ Eiss and Harbeck suggest a semantic differential scale may be useful to show the extent to which a student likes science as well as to provide some indication of the student's values.²⁰ Rothman, in a study of college freshmen taking chemistry and physics, used a science-related semantic differential instrument.²¹

Seven of the remaining nine items were chosen for the questionnaire from a 71 item Laboratory Evaluation Form distributed by the Physics Department at Kansas State University to all students enrolled in introductory physics laboratory courses.²²

The sixteen items referred to above were included on an eighteen item questionnaire that was distributed to freshman chemistry students at Kansas State University during a scheduled lecture period in the last week of the spring semester. (See Appendix)

In addition to the seven items chosen from the Physics Laboratory Evaluation Form, two additional items were added to the 71 item questionnaire for the purposes of this study. (See Appendix) The questionnaire was distributed to all students enrolled in introductory physics laboratory courses at Kansas State University near the end of the spring semester of 1973.

Both chemistry and physics students responded on mark-sense computer cards.

SCORING OF INSTRUMENT

The S was assigned a score on six of the semantic differential word pairs (items 5-10 on the Chemistry Questionnaire). The response closest to the word with positive attitudinal implications received a score of 5, and the response closest to the word with negative implications received a score of 1, with responses in between the two receiving scores of 4, 3, and 2 respectively.

The S was also assigned a score on items 2 and 3 of the Chemistry Questionnaire, ranging in magnitude from a score of 1 for response "a" (definitely false) to a score

of 5 for response "e" (definitely true).

The sum of these two scores was taken to be an indication of the S's attitude toward chemistry.

Since the six semantic differential word pairs did not appear on the questionnaire distributed to physics students, attitude scores were not computed.

DEFINITIONS

The grade of the S in Chemistry and Physics used was the S's estimate of semester grade indicated on the questionnaire.

Frequent Users of the Help Room visit two or more times a month. Frequent users of the Activities Center have been there five or more times. Less frequent use of these facilities as indicated on the questionnaire defines occasional users, and those who have never been to the Help Room or Activities Center are defined as non-users.

SUBJECTS

Chemistry Ss were 388 students enrolled in Chemistry I and Chemistry II at Kansas State University. The S responded to questionnaires distributed during a lecture period the last week of the spring semester of 1973. Attendance at Chemistry I and Chemistry II lectures is optional so that only about 57% of the total population of students

enrolled in the courses completed questionnaires.

Physics Ss were 1,034 students enrolled in laboratory sections of introductory physics courses at Kansas State University. The Ss responded to questionnaires distributed in laboratory near the end of the spring semester and attendance at that laboratory period was required. Students polled were from the physical science survey courses as well as the more rigorous introductory courses offered for pre-vet and engineering students.

ANALYSIS OF DATA

Ss responses were transferred by computer from Mark-Sense computer cards to punched cards. The following statistical tests were then run by computer, using programs provided by the College of Education at Kansas State University.

1. Analysis of Variance, All Chemistry Ss
Criterion = Attitude, Groups = Users and Non-Users
2. Analysis of Variance, Chemistry Users Only
Criterion = Attitude, Groups = Frequency of Use
3. Pearson Product Moment Correlation Matrix
 - a. All Chemistry Ss
 - b. Chemistry Users Only
4. Pearson Product Moment Correlation Matrix
 - a. All Physics Ss
 - b. Physics Users Only

5. Chi-Square Test of Independence, Chemistry Help Room
Users vs. Non-Users
6. Chi-Square Test of Independence,
 - a. All Chemistry Ss vs. All Physics Ss
 - b. Chemistry Users vs. Physics Users.

Chapter 4

RESULTS

From the data in Table 1 it can be seen that users of the Chemistry Help Room had a significantly better attitude ($p=.05$) toward chemistry than non-users.

Table 1

Analysis of Variance - All Chemistry Ss
Criterion = Attitude, Groups = Users and Non-Users

Average Attitude Score		
Users	28.19	F-Ratio = 4.6553*
Non-Users	26.43	

* $p = .05$

The results shown in Table 2 indicate there was no significant difference in attitude among users of the Chemistry Help Room according to frequency of Help Room visits.

Table 2

Analysis of Variance - All Chemistry Ss
 Criterion = Attitude, Groups = Frequency of Visits

Frequency of Use	Four or more times/ month	Two or three times/ month	Once or twice/ month	Less than once/ month
Average Attitude Score	28.89	28.22	27.75	28.18

F-Ratio = 0.3725

The data in Tables 3 and 4 show that significant correlations ($p=.01$) were found between:

1. grade expected and feelings that visits to the Help Room helped subject's grade.
2. frequency of Help Room visits and feelings that Help Room use raised subject's grade.
3. frequency of Help Room (Activities Center) visits and having more positive feelings toward chemistry (physics) as a result of visiting the Help Room (Activities Center).
4. having a strong desire to take chemistry (physics) and having more positive feelings toward chemistry (physics) as a result of taking this course.

There were no other significant correlations found among the research questions investigated.

Table 3
Pearson Product Moment Correlation Coefficients

	All Physics Ss	All Chemistry Ss
Strong desire to take course and more positive feelings toward field of study due to course.	0.4130*	0.4663*
Grade expected and whether or not used Help Room or Activities Center	0.0012	0.0376

*p=.01

Table 4
Pearson Product Moment Correlation Coefficients

	Physics Users	Chemistry Users
Frequency of visits and more positive feelings toward field of study due to Help Room or Activities Center visits	0.2632*	-0.3020*
Frequency of Help Room or Activities Center Visits and feeling that visits affected grade	0.1707	0.3002*
Grade expected and feeling that visits affected grade	0.0594	0.2656*
Grade expected and frequency of Help Room or Activities Center visits	0.0385	0.1543

*p=.01

As can be seen in Table 5 there was no significant difference between chemistry users and non-users on the following items:

1. grade expected
2. a strong desire to take the course
3. positive feelings toward chemistry as a result of taking this course
4. the major purpose of the Help Room

Table 5
Values of Chi-Square for Chemistry
Users vs. Non-Users

	Value of Chi-Square
Grade Expected	7.0055
Strong Desire to Take Course	4.0044
Positive feelings toward field of study due to course	9.0170
Major purpose of Help Room	9.6636

The data in Tables 6, 7, 8, 9, 10 and 11, show that there was found to be a significant difference ($p=.01$) between chemistry Ss and physics Ss on the following items:

1. Physics Ss expected to receive higher grades than chemistry Ss.
2. A much larger percentage of chemistry Ss used the Help Room than physics Ss used the Activities Center.

3. More chemistry Ss wanted to take chemistry than physics Ss wanted to take physics.
4. A greater percentage of chemistry Ss than physics Ss had more positive feelings as a result of taking this course.
5. A large percentage of chemistry Ss felt the major purpose of the Help Room was to receive help with their assignments. The physics Ss responses to this question were almost evenly distributed over the four choices offered.

Table 6
Value of Chi-Square, Chemistry Ss
vs. Physics Ss

	Value of Chi-Square	
	All Ss	Users Only
Grade Expected	99.9194*	38.5535*
Whether or not use Help Room or Activities Center	214.5529*	----
Frequency of Use	----	96.1722*
How Visits Affect Grade	----	178.0292*
Strong Desire to Take Course	158.4061*	94.8263*
More positive feelings toward field of study due to course	20.7619*	22.1056*
More positive feelings toward field of study due to Help Room and Activities Center visits	----	10.3914
Major purpose of Help Room or Activities Center	132.8303*	120.4251*

*p=.01

Table 7
Percent of Ss Expecting Each Grade
in Science Course

	A	B	C	D	F
All Chemistry Ss	14%	40%	40%	5%	1%
All Physics Ss	24%	57%	18%	1%	0%
Chemistry Users	14%	40%	42%	4%	0%
Physics Users	21%	56%	21%	2%	0%

Table 8
Percent and Number of Ss that have been to the
Help Room or Activities Center

	Yes	No
Chemistry	78%	22%
	299	82
Physics	35%	65%
	347	657

Table 9
I had a strong desire to take this
course--Percent of Ss

	Definitely True	More True than false	In Be- tween	More false than true	Defi- nitely False
Chemistry	12%	27%	30%	20%	11%
Physics	3%	10%	24%	32%	31%

Table 10

As a Result of Taking This Course I Have More
Postive Feelings Toward this Field of Study

	Definitely True	More True In Be- than False	More False tween than True	Definitely False
Chemistry	14%	31%	25%	20%
Physics	17%	22%	27%	17%

Table 11

What Ss Perceive to be the Major Purpose of
the Help Room and Activities Center (all Ss)

	Help with Assign- ments	Ask Questions of Interest	Work Indepen- dently or with others	Use of Supple- mentary Mat'ls.
Chemistry	75%	6%	3.5%	15.5%
Physics	31%	28%	17 %	24 %

The data in Tables 6, 12, and 13 show that there was found to be a significant difference ($p=.01$) between chemistry users and physics users on the following items:

1. A larger percentage of chemistry users were frequent users of the Help Room, than physics users were frequent users of the Activities Center.

2. A large percentage of chemistry users felt that Help Room use helped to raise their grade, while a large percentage of physics users felt that Activities Center use had no effect upon their grade.

Table 12

Frequency of Help Room or Activities Center
Use (percent of Users)

	Frequent Users	Occasional Users
Chemistry Help Room	49.5%	47.5%
Physics Activities Center	16.5%	83.5%

Table 13

How Users Felt Help Room and Activities
Center Visits Affected Grade
(percent users)

	Raise	No Effect	Lower
Chemistry	69%	25%	6%
Physics	20%	77%	3%

The data in Tables 6 and 14 show that there was no significant difference found between chemistry users and

physics users on having more positive feelings toward science as a result of using either center.

Table 14

As a Result of Visiting the Help Room (or
Activities Center) I have more Positive
Feelings toward this Field of Study
(percent users)

	Definitely True	More True than False	In be- tween	More False than True	Defi- nitely False
Chemistry	10%	25%	39%	16%	10%
Physics	9%	26%	45%	7%	13%

Chapter 5

DISCUSSION

It is encouraging to find that users of the Help Room had a significantly better attitude toward chemistry than non-users. This, in itself, does not indicate where these attitudes or feelings originate. It does, however, suggest an area for future research. An instrument designed to measure attitudes toward chemistry and physics could be administered to Ss several times during the course of a semester. The correlation between this data and the use of the Help Room and Activities Center might give some greater insights into where the attitudes of users and non-users originate.

Even though it was found that there is no difference in grade expectations between users and non-users of the Help Room and Activities Center, it is worth noting that 69% of the chemistry users and 20% of the physics users felt that their visits did help to improve their grades. (See Table 13) In addition, 35% of both the chemistry users and the physics users felt that use of the Help Room and Activities Center contributed to a more positive feeling toward science. (See Table 14) Therefore, whether or not the Help Room and Activities Center actually affected Ss attitude or grade, the Ss felt that it had. In terms of affective behaviors and

attitudes, this is important.

Another possibility for future research would be to ask Ss why they felt they had more positive feelings toward the field of study as a result of using these facilities.

These results show there is little relationship between the way chemistry Ss responded and the way physics Ss responded to the questions on the questionnaire. It is particularly evident when one examines the percentage of chemistry Ss who use the Help Room as opposed to the percentage of physics Ss who use the Activities Center. (See Table 1) Chemistry users visit the Help Room more often than physics users visit the Activities Center. (See Table 10) This can be explained through the difference in focus of the two centers. Chemistry students faced with problems with their assignments can go directly to the Help Room for immediate aid. Solutions to problems are available, as is a graduate student to explain them. The help received in the Activities Center is less direct. Rather than being given a clear cut solution to a problem, the student may view a film loop on the subject, or perform related experiments or activities. But a student may also go to the Activities Center just to perform activities that interest him. This is not usually the case with the Help Room, as most of the materials there are directly related to course content and assignments.

Another reason for the difference in distribution between chemistry Ss and physics Ss could be because the Physics Activities Center has only been in operation one

academic year, while the Chemistry Help Room has been in operation around five years. The reputation of the Help Room, and its use, grew with the years it was in operation. It is possible that in another year or two the reputation of the Activities Center may change, and as a result so may the numbers of students who use the center and the frequency of their visits. It would be useful, therefore, to survey physics Ss again in a year or two and to compare those results with ones obtained here.

The distribution of what Ss do in the Help Room can be seen in Table 15. This is related to what the subjects perceive to be the major purpose of the Help Room. (See Table 14)

Table 15

Why Users go to Help Room (Percent Users who indicated each option)

	Help With Assign- ments	Ask Ques- tions of Interest	Work inde- pendently or with others	Use Sup- plemen- tary Ma- terials
Chemistry	67%	11%	15%	7%

Footnotes

¹Teaching Assistant Handbook, Department of Chemistry, Kansas State University (1971-72), 8.

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⁴Lewis R. Aiken, Jr. and Dorothy R. Aiken, "Recent Research on Attitudes Concerning Science," Science Education, LIII, 4 (October, 1969), 295.

⁵Wilber H. Dutton and Lois Stephens, "Measuring Attitudes Toward Science," School Science and Mathematics, LXIII, 1 (January, 1963), p. 43.

⁶James Joseph Gallagher and Willard W. Korth, "Test Every Senior Project: Attitudes of Seniors Concerning Science" (paper read at National Association in Science Teaching Conference, February, 1969, Pasadena, California).

⁷Ibid.

⁸Aiken and Aiken, op. cit., p. 296.

⁹Ibid., p. 298.

¹⁰Ibid., p. 297.

¹¹Patricia M. Schwirian and Barbara Thomson, "Changing Attitudes Toward Science: Undergraduates in 1967 and 1971," Journal of Research in Science Teaching, IX, 3 (1972), 253.

¹²Chester J. Brown and Walter E. Elliot, "Perceptions of Physics and Physics Teachers by College Students," Journal of Research in Science Teaching, X, 1 (1973), 51.

¹³Arthur I. Rothman, "Responses to Science Concepts on a Semantic Differential Instrument and Achievement in Freshman Physics and Chemistry," Journal of Research in Science Teaching, V (1967), 168.

¹⁴Ibid., p. 172.

¹⁵David R. Krathwohl, Benjamin S. Bloom, and Bertram B. Masia, Taxonomy of Educational Objectives--The Classification of Educational Goals, Handbook II: Affective Domain (New York: David McKay Co., 1964), pp. 176-185.

¹⁶Aiken and Aiken, op. cit., p. 302.

¹⁷Kristine Brown, Ronald Sklar, and James F. Corwin, "A Science Teaching Resource Center at Work," Journal of College Science Teaching, II, 2 (December, 1972), 24-25.

¹⁸Oppenheimer, loc. cit.

¹⁹Aiken and Aiken, op. cit., p. 296.

²⁰Albert F. Eiss and Mary Blatt Harbeck, "Behavioral Objectives in the Affective Domain" (National Science Supervisors Association, Washington, D. C., 1969).

²¹Rothman, op. cit., p. 168.

²²Jacqueline D. Spears, Dean A. Zollman, and C. E. Hathaway (Paper read at Annual Summer Meeting of the American Association of Physics Teachers, Reno, Nevada, June, 1973).

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APPENDICES

Questionnaire Distributed to
Chemistry Students

1. Estimate the grade you expect to receive in Chemistry this semester.

- a) A b) B c) C d) D e) F

Questions 2 and 3--Describe your personal attitudes in this course using the following key:

- a) definitely false
- b) more false than true
- c) in between
- d) more true than false
- e) definitely true

2. I had a strong desire to take this course.

3. As a result of taking this course I have more positive feelings toward this field of study.

Questions 4-10--Describe your personal feelings toward chemistry using the following key:

- a) my feelings are most like the word on the left
- b) my feelings are more like the word on the left than the word on the right
- c) in between
- d) my feelings are more like the word on the right than the word on the left
- e) my feelings are most like the word on the right

Chemistry is

4. easy a ; b ; c ; d ; e troublesome

5. useful a ; b ; c ; d ; e unnecessary

6. interesting a ; b ; c ; d ; e dull

7. good a ; b ; c ; d ; e bad

8. intellectually stimulating a ; b ; c ; d ;
 e boring

9. meaningful a ; b ; c ; d ; e irrelevant

10. integrated a; b; c; d; e disjointed
11. I feel the major purpose of the Chemistry Help Room is
- a) to use solutions to homework problems
 - b) to receive help from the staff with my assignments
 - c) to ask questions about chemistry that interest me
 - d) to work independently or with other students on chemistry
 - e) to use supplementary materials supplied in the Help Room
12. Have you ever visited the Chemistry Help Room?
- a) yes
 - b) no

If you indicated choice "a" on question 14 please finish this questionnaire.

If you indicated choice "b" on question 14, skip the rest of the questions and turn in your questionnaire. Thank you.

13. How often do you visit the Chemistry Help Room?
- a) Four or more times a month
 - b) Two or three times a month
 - c) Once or twice a month
 - d) Less than once a month
14. When you go to the Help Room, what do you do? (Please check any number of responses)
- a) Use provided solutions to assigned problems
 - b) Ask questions of help room staff about assignments
 - c) Work independently or with small groups of students
 - d) Use supplementary Materials available in the Help Room
 - e) Ask the Help Room staff questions about chemistry that interest me
15. Do you feel your visits to the Help Room
- a) Help you raise your grade in Chemistry
 - b) Have no effect on your grade in Chemistry
 - c) Cause you to receive a lower grade in Chemistry

16. As a result of visiting the Chemistry Help Room I have a more positive feeling toward this field of study

- a) definitely false
- b) more false than true
- c) in between
- d) more true than false
- e) definitely true

THANK YOU.

Questions from Physics Questionnaire

Estimate the grade you expect to receive

1 = A 2 = B 3 = C 4 = D 5 = F

Did you ever visit the Physics Activities Center

1 = yes 2 = no

How many times did you visit the Activities Center

1 = once 2 = twice 3 = three times 4 = four times
5 = five or more times

Why did you go to the Activities Center?

1. to perform activities
2. to view film loops
3. to obtain help with assignments
4. out of curiosity

Did your visits to the Activities Center

1. help you raise your grade in the course or lab?
2. have no effect on your grade?
3. cause you to receive a lower grade in lecture or in lab?

I had a strong desire to take this course

1. definitely false
2. more false than true
3. in between
4. more true than false
5. definitely true

As a result of taking this course I have more positive feelings toward this field of study.

1. definitely false
2. more false than true
3. in between
4. more true than false
5. definitely true

As a result of visiting the Activities Center I have more positive feelings toward this field of study.

1. definitely false
2. more false than true
3. in between
4. more true than false
5. definitely true

What do you feel is the major purpose of the Activities Center?

1. to obtain help with assignments
2. to ask questions about physics that interest me
3. to work independently or with other students on Physics
4. to view film loops
5. to perform activities.

**A STUDY OF THE RELATIONSHIP BETWEEN STUDENT ATTITUDE
TOWARD SCIENCE AND USE OF THE CHEMISTRY HELP
ROOM AND THE PHYSICS ACTIVITIES CENTER**

by

ROXANNE NARENS PETTUS

B.S., Purdue University, 1971

AN ABSTRACT OF A MASTER'S REPORT

**submitted in partial fulfillment of the
requirements for the degree**

MASTER OF SCIENCE

College of Education

**KANSAS STATE UNIVERSITY
Manhattan, Kansas**

1973

In recent years there has been an increased trend toward individualization of instruction at the elementary and secondary school level. This trend is reflected in the new science curricula that are designed to be used by the student in a self-paced program. In contrast to elementary and secondary school procedures, college science education has been organized around a large lecture format.

The Chemistry and Physics Departments at Kansas State University operate facilities designed to provide more personal involvement and individual attention for the students. The purpose of this study was to examine whether there is a relationship between the attitude of the student toward the area of science he is studying, and use of these supplementary facilities.

Thus, 388 introductory chemistry students and 1,034 introductory physics students at Kansas State University were asked about their feelings toward science, their grades, and their use of the Chemistry Help Room and the Physics Activities Center. It was found that Chemistry Help Room users had a significantly better attitude toward chemistry than non-users. There was no relationship between the grade expected in chemistry or physics and use of either center. Chemistry students responded significantly differently to the questions on the questionnaire than physics students. Sixty-nine percent of the chemistry users and twenty percent of the physics users felt that use of the centers helped to raise their grades.