ABSTRACT
            This research project provides an individualized
format for a three-year integrated junior high school science
curriculum. The purpose of the study was to assess the relationship
between student self-ratings on such variables as (1) ability to
operate independently of the teacher, (2) use class time effectively,
(3) develop their own plan for completing work, and (4) work at a
pace commensurate with perceived ability and success in the course. A
group of teachers enrolled in an Intermediate Science Curriculum
Study (ISCS) in-service course were asked to administer a
Self-Directed Rating Scale to their ISCS students. Data were
collected from a total of 1108 students and were analyzed using
analysis of variance tests and t-tests to determine significant
differences among the variables measured. When students were compared
in terms of their relative degree of success in the program it was
obvious that students who were more successful perceived themselves
as being more self-directed. Experience in the program had a
significant effect on how students perceived their ability to direct
their own learning activities. In general, girls in this sample saw
themselves as more self-directed than did boys. (Author/EB)

Donald W. McCurdy

AN ANALYSIS OF QUALITIES OF SELF-DIRECTEDNESS

AS RELATED TO SELECTED CHARACTERISTICS

OF I.S.C.S. STUDENTS

In recent years curriculum development at the secondary level has pro-
duced a number of programs which require the student to be more self-
directed and independent. The role of the student and teacher in these
programs has changed dramatically. Students assume a more active rather
than passive responsibility for their own learning--working on laboratory
activities, reading, listening to auto-tutorial devices, consulting with
the teacher or other students. Each works at a pace commensurate with his
own ability interest and motivation not "bound" by what other students
are doing.

The teacher, on the other hand spends a high proportion of his time
challenging, supporting and motivating students in one-on-one situations
and in small groups. He is identifying, organizing and managing instruc-
tional resources. The traditional role of presenting information to stu-
dents is reduced in favor of mediated materials and multiple printed re-
sources. Sound-filmstrips and other forms of auto-tutorial devices be-
come more abundant in such classes.

One such illustrative program is the Intermediate Science Curriculum
Study (I.S.C.S.). This project provides an individualized format for a
three-year integrated junior high school science curriculum. The seventh
grade (Level I) materials focus on concepts drawn form the area of physics;
eighth grade (Level II) delves primarily into basic principles of chemistry

and the ninth grade program (Level III) is modular and draws from the biological and earth sciences. Students in this program work independently or in small groups almost entirely in a laboratory setting. The textbooks are arranged in a semi-programmed fashion so that the student is less dependent on the teacher for information and directions.

PURPOSE OF THE STUDY

The Intermediate Science Curriculum Study (I.S.C.S.) was designed with a basic assumption that junior high students could be largely self-directed under the supervision of a competent instructor. Translated to a paradigm for implementation, it was assumed that the student was able to (1) operate independently of the teacher (2) seek answers to questions and problems without assistance (3) use class time effectively (4) develop a plan for completing work (5) use basic study skills (6) proceed through the activities independently (7) adapt activities and assignments to needs (8) work at a pace commensurate with perceived ability (9) make use of excursions (enrichment and remedial materials) and (10) collect own laboratory materials.

The purpose of this study was to assess the relationship between student self-ratings on the above variables and (1) success in the course (2) level of the student in the I.S.C.S. program (I, II, or III) (3) school where the student attended and (4) sex of the student.

Procedures

A group of teachers enrolled in an I.S.C.S. in-service course were asked to administer a Self-Directed Rating Scale (S.D.R.S.) to their I.S.C.S. students. This group of teachers provided data during the spring of 1973

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from six schools and a total of 1108 students, all in the Omaha, Nebraska area.

The instrument (S.D.R.S.) consisted of ten items, one for each of the self-directed skills cited above. Students were asked to indicate on a five-point scale (supported by three behavior descriptions) the degree to which they perceived they had attained each skill. A rating of 1 or 2 indicated low ability on that skill. 3 indicated moderate ability and 4 or 5 indicated high ability.

The data were analyzed using analysis of variance tests and "T" tests to determine whether or not significant differences could be detected among the variables measured. The results of these tests disclosed how various groupings of I.S.C.S. students perceived themselves with regard to the ten variables of self-direction and overall (total) self-directedness. (A total self-direction score was obtained by adding the ratings assigned to each of the ten variables.)

FINDINGS

Self-Direction Ratings According to Achievement

The teachers involved in the study were asked to identify students who were in the top 15% and bottom 15% of their classes with regard to performance (grades) in the program. Thus were identified three groups --top 15% middle 70% and bottom 15%.

The means standard deviations and F scores for these three groups are shown in Table I. When students were compared in terms of their relative degree of success in the program it was obvious that students who were more successful perceived themselves as being more self-directed.

TABLE I

ANALYSIS OF RATINGS OF SELF-DIRECTION
IN RELATION TO ACHIEVEMENT
AMONG I.S.C.S. STUDENTS

Skills of Self-Direction	Top Achievers N=52		Middle Achievers N=790		Bottom Achievers N=167		F-S
	Mean	SD	Mean	SD	Mean	SD	
1. Amount of Teacher Direction	4.375	0.618	4.113	0.823	3.593	1.133	36.8**
2. Seeking Answers Independently	3.829	1.184	3.659	1.131	3.509	1.192	3.09*
3. Using Class Time	3.735	0.828	3.265	1.006	2.772	1.134	36.8**
4. Planning a Work Schedule	3.572	1.113	3.248	1.123	2.689	1.166	26.1**
5. Using Study Skills	4.086	0.921	3.710	1.024	3.054	1.137	42.8**
6. Using Self-Teaching Curriculum Materials	3.809	0.668	3.629	0.808	3.180	0.977	27.3**
7. Adapting Curriculum	2.414	1.006	2.535	0.956	2.695	1.045	3.4*
8. Pace of Learning	3.901	0.954	3.347	1.039	2.611	1.075	63.6**
9. Use of Excursions	4.289	1.211	3.859	1.379	3.204	1.608	25.2**
10. Collecting Laboratory Materials	3.809	1.132	3.819	1.194	3.485	1.418	5.2*
TOTAL Self-Directedness Score	37.783	4.596	35.257	6.096	30.904	5.931	58.1**

* Significant at .05 level
** Significant at .01 level

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McCurdy and Wood found strikingly similar results in a study of students
in the Nebraska Physical Science Project--an individualized chemistry-physics
course.[1] They found that students who were rated in the top 15% of their
classes rated themselves significantly (.01 level) more capable than did
those in the bottom 15% of (1) operating independent of the teacher's di-
rection, (2) using class time effectively, (3) planning a work schedule,
(4) using study skills, (5) using the N.P.S.P. packages and other materials
without assistance, and working at a pace commensurate with their ability.

The total score means of 37.78, 35.26, and 30.90 for the high, middle
and low achievers respectively, indicated highly significant (F=58.1)
variation among these groups. It should be noted that every one of the ten
skills showed a significant variation among the groups at least at the .05
level of confidence. All but three, (seeking answer independently, adapting
curriculum, and collecting laboratory materials) were significant at the .01
level of confidence.

It is interesting to note that in one case (adapting curriculum) the
means were in reverse order (i.e., 2.414, 2.535, and 2.695) for the high,
middle and low groups respectively. In every other case the relative magni-
tude of the means was as one would expect (i.e., the high achievers per-
ceiving themselves as more self-directed than the middle and low achievers).
Apparently high achievers were more reluctant to skip activities and/or
assignments regardless of whether they perceived them as needed or not. This
finding is consistent with that of Torrance and others[2,3] that high achievers
tend to be conformists.

Self-Direction Rating According to I.S.C.S. Level (I, II, or III)

The figures in Table II present an analysis of the data of ratings of self-direction according to the level of the program in which the student was engaged (i.e., I, II, and III or generally seventh, eighth and ninth grades respectively). Although all of the "F scores" for the ten individual skills of self-direction, with the exception of the Use of Excursions, were nonsignificant, the means show a general trend in favor of the eighth graders and the total self-directedness score means were significantly different at the .01 level of confidence (34.381 for 7th graders, 35.561 for eighth graders and 35.141 for ninth graders).

A possible explanation for the apparent greater degree of perceived self-directedness on the part of eighth graders as opposed to seventh or ninth graders is that all of the Level I students were new to the individualized format of I.S.C.S. and many Level III students were in the program for the first time. Quite a number of schools, including some in this study, were using the Level III modules at the ninth grade level but were not using Level I or Level II. This meant that a high proportion of Level III students were working in an individualized program for the first time.

It should be noted that the areas in which Level III students scored high are generally those associated with increased maturity rather than with an individualized program per se. (i.e., planning a work schedule, using study skills, and collecting laboratory materials). It takes time for students to adjust to working in an individualized mode. Eighth graders who have over a year's experience with the program perceive themselves as being more self-directed than do the less experienced seventh

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TABLE II

ANALYSIS OF RATINGS OF SELF-DIRECTION
IN RELATION TO LEVEL (I, II, III)
AMONG I.S.C.S. STUDENTS

Skills of Self-Direction	Level I (7th grade) N=535		Level II (8th grade) N=410		Level III (9th grade) N=164		F-S
	Mean	SD	Mean	SD	Mean	SD	
1. Amount of Teacher Direction	4.034	0.878	4.156	0.876	3.975	0.889	2.25
2. Seeking Answers Independently	3.664	1.123	3.690	1.195	3.577	1.127	0.49
3. Using Class Time	3.247	1.074	3.298	1.036	3.178	0.909	0.57
4. Planning a Work Schedule	3.151	1.179	3.208	1.104	3.393	1.178	1.98
5. Using Study Skills	3.643	1.073	3.658	1.062	3.736	1.071	0.35
6. Using Self-Teaching Curriculum Materials	3.525	0.811	3.663	0.833	3.589	0.921	2.17
7. Adapting Curriculum	2.507	0.967	2.619	0.996	2.446	0.970	1.47
8. Pace of Learning	3.303	1.090	3.271	1.119	3.442	1.013	1.10
9. Use of Excursions	3.548	1.477	4.227	1.262	3.681	1.409	19.315*
10. Collecting Laboratory Materials	3.755	1.277	3.721	1.237	3.926	1.010	1.2
TOTAL Self-Directedness Score	34.381	5.912	35.561	5.887	35.141	5.548	32.74*

* Significant at .01 level

graders and even the more mature but less "I.S.C.S." oriented ninth graders.
A year's experience with the program for 8th graders compared with no
prior experience for 7th and 9th graders is evidently a more significant
factor than chronological maturation.

A good example of this experience factor is the "use of excursions"
variable in which the difference in self ratings was significant at the .01
level. The high mean score of eighth graders, 4.227, as compared to seventh
graders, 3.548, and ninth graders, 3.681, was probably due to the fact
that Level II students have had an additional year's experience with the pro-
gram and have learned to take greater advantage of the excursions.

Self-Direction Ratings According to School Attended

The self-directed ratings of the 1108 I.S.C.S. students in the six
schools are shown in Table III. The means and standard deviations for each
of the six schools are recorded in the table.

Mean scores from Schools I and II were closely grouped (36.2 and 36.3
respectively) as were the mean scores from Schools IV and V (34.79 and
34.67 respectively). Students in Schools III and VI rated themselves sig-
nificantly lower with scores of 33.111 and 30.851 respectively.

Of the ten variable skills of self-direction only one--seeking answers
independently--failed to yield an "F score" significant at the .01 level
of confidence.

It is interesting to note that the greatest variation among schools
occured in the way students rated themselves on the traditional work habits
such as "using class time" F=7.12, "planning a work schedule" F=10.57,
"using study skills" F=6.25, and "collecting laboratory materials" F=8.40.
Those characteristics more closely related to elements associated with an

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TABLE III

ANALYSIS OF RATINGS OF SELF-DIRECTION IN RELATION TO SCHOOL ATTENDED BY I.S.C.S. STUDENTS

Skills of Self-Direction	School I N=33		School II N=245		School III N=144		School IV N=97		School V N=39		School VI N=141		F-S
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
1. Amount of Teacher Direction	4.174	0.837	4.082	0.897	4.063	0.962	3.918	0.862	3.897	0.852	3.879	0.974	3.49**
2. Seeking Answers Independently	3.673	1.184	3.735	1.123	3.632	1.163	3.536	1.031	3.462	1.354	3.652	1.089	0.69
3. Using Class Time	3.405	0.997	3.347	0.970	3.049	1.105	3.237	0.826	3.026	1.038	2.908	1.207	7.12**
4. Planning a Work Schedule	3.251	1.070	3.408	1.115	3.146	1.165	3.515	1.042	3.026	1.246	2.638	1.311	10.57**
5. Using Study Skills	3.751	1.018	3.796	0.923	3.458	1.176	3.814	1.034	3.538	1.189	3.305	1.213	6.25**
6. Using Self-Teaching Curriculum Materials	3.670	0.808	3.678	0.803	3.431	0.896	3.608	0.896	3.359	0.707	3.362	0.847	5.17**
7. Adapting Curriculum	2.602	0.971	2.567	0.924	2.667	1.024	2.567	0.956	2.128	0.833	2.291	1.052	4.14**
8. Pace of Learning	3.319	1.080	3.424	1.086	3.319	1.101	3.495	0.991	3.256	1.117	2.993	1.131	3.49**
9. Use of Excursions	3.412	1.101	4.486	1.019	2.722	1.356	3.144	1.331	4.436	1.165	2.525	1.437	96.64**
10. Collecting Laboratory Materials	3.941	1.169	3.767	1.130	3.590	1.361	3.866	0.942	4.103	1.165	3.248	1.440	8.40**
TOTAL Self-Directedness Score	36.235	6.040	36.310	5.607	33.111	5.676	34.794	5.303	34.667	5.440	30.851	5.929	24.03**

** Significant at .01 level

individualized program showed less variation (e.g., "amount of teacher direction" (F=3.49) "adapting curriculum" (F=4.14) and "pace of learning" (F=3.49)).

Clearly there was a significant environmental influence on the way students perceived their ability to direct their own learning activities. Whether this is a "school" or "community" influence or is a function of the way different teachers operate the I.S.C.S. program is not revealed by these data.

It is interesting to note that students in Schools I and II, where the highest scores on self-directedness were recorded, reside in the same school district located in an affluent suburb of Omaha.

Self-Direction Ratings According To Sex

A glance at Table IV shows that, in general, girls in the I.S.C.S. program perceive themselves as being more self-directed than do boys. The "T" score of 3.274 for total self-directedness is significantly (.01) in favor of girls.

Among the skills of self-direction boys scored higher on only two (i.e., seeking answers independently and adapting curriculum). Of these two, only "adapting curriculum" was statistically significant. A possible explanation for boys scoring high on these two variables might be that seeking answers independently and a willingness to skip activities and/or assignments regardless of whether or not they were perceived as needed, represented a greater degree of independence on the part of boys. Our society has tended to impart aggressiveness and independence as traditional male characteristics.

Girls apparently perceived themselves as making greater use of their time, planning better work schedules, using study skills and controlling the pace of their own learning.

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TABLE IV

DIFFERENCES IN RATINGS OF SELF-DIRECTION
BY MALE AND FEMALE
I.S.C.S. STUDENTS

Skills of Self-Direction	Males (N=555)		Females (N=553)		
	Mean	SD	Mean	SD	F-Score
1. Amount of Teacher Direction	4.036	.905	4.110	0.847	1.410
2. Seeking Answers Independently	3.697	1.294	3.624	1.159	-1.064
3. Using Class Time	3.159	1.061	3.347	1.008	3.033**
4. Planning A Work Schedule	3.124	1.168	3.282	1.140	2.274*
5. Using Study Skills	3.602	1.147	3.712	0.992	1.717*
6. Using Self-Teaching Curriculum Materials	3.562	0.873	3.600	0.815	0.752
7. .'apting Curriculum	2.638	1.018	2.441	0.935	-3.348*
8. Pace of Learning	3.166	1.155	3.450	1.013	+4.358**
9. Use of Excursions	3.659	1.510	3.976	1.325	3.715**
10. Collecting Laborator Materials	3.692	1.275	3.837	1.181	1.969**
TOTAL Self-Directedness Score	34.347	6.128	35.544	5.943	3.274**

* Significant at .05 level of confidence
** Significant at .01 level of confidence

Conclusions

These findings provide strong evidence to support the assumption that student success in highly individualized programs like I.S.C.S. require skills of self-direction. The results clearly showed that students who were more successful in the program perceived themselves as being more self-directed than did students who were less successful.

The results of this study also indicate that experience in the program had a significant effect on how students perceived their ability to direct their own learning activities. Level II students were found to be significantly more self-directional than Level I students. They also perceived themselves to be more self-directed than ninth graders who in terms of this study, generally had less experience with individualized programs.

Another possible conclusion that may be inferred from this study is that variations in school populations, school climates and/or ways in which schools and teachers operate the I.S.C.S. program may influence the perceived self-directedness on the part of students involved. However, these data do not focus specifically on this question.

It is also clear that in the case of this sample of I.S.C.S students, there were significant differences in the way males and females perceived their ability to direct their own learning activities. In general, girls in this sample saw themselves as more self-directed than did the boys.

Implications

1. Since perceived self-direction ability seems to be related to success in a program like I.S.C.S., it would seem both plausible and wise to attempt to measure this variable at the beginning of the year so that

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students who score low could be detected. Collection of such information would also provide the teacher with important diagnostic data--this data could be used to either adjust the instructional aspects to the student and/or to identify and foster the needed acquisition of independent study skills.

2. Results of this study also imply that the relative success of a program like I.S.C.S. will be a function of the "climate" within the school. Undoubtedly "climate" is a complex variable consisting of many factors. This study sheds little light on what these factors might be.

3. The study suggests that boys are more likely to have difficulties with programs like I.S.C.S. than are girls. It is entirely possible that the less conforming attitude nurtured in our societal "rearing habits" for the male offspring places greater need/importance on such aspects of the program as "relevance", "interest" and "utility". It appears that although boys can and do possess the same capacity for self-directness, they may have a tendency to withhold the skills until the aforementioned elements are in evidence. Thus teachers should keep this phenomenon in mind as they work with youngsters in individualized programs.

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