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Applied Creativity: The Creative Studies Project

Part II — Results of the Two-Year Program*

The authors wish to express their deep appreciation to the administration and faculty of Buffalo State University College for making possible this unique research project. Throughout the project, we have had the cooperation and encouragement of many college administrators and faculty members, as well as several committees. Ongoing assistance was provided by the members of a College research committee, which also met periodically with the National Advisory Committee; these individuals were listed in Part I of this series (Journal of Creative Behavior, *Volume 6, Number 1, 1972*).

What happens when you involve a group of incoming college freshmen in a unique sequence of semester-long, credit-bearing courses in Creative Studies?

Well, quite an impressive picture emerges, though not everything you might expect, whether you are statistically oriented and base your conclusion on some 200 research measurements made over the two-year period on the students and their comparable controls not taking the courses, or whether you are more interested in listening to the students and hearing their own interpretations of how the program affected them. The courses concentrate on awareness-development, creative problem-solving, synectics, and creative analysis (general semantics) processes. The contents will be described in detail in the next issue.

CAPSULE OF SCIENTIFIC FINDINGS

First, to capsulize briefly the statistical picture, much of which will be spelled out later in the article: (a) These course students show significant differences over comparable controls in ability

to cope with real-life situational tests, including not only the production of ideas, but also their evaluation and development. (b) They show significant differences over comparable controls in applying their creative abilities in special tests given in English courses. (c) They perform significantly better than the comparable controls on the semantic and behavioral half of J. P. Guilford's Structure-of-Intellect (S-O-I) model, including three of five of his mental operations — cognition, divergent production and convergent production; they show no significant accomplishment over the controls in the symbolic and figural half of Guilford's model, nor in his memory or evaluation operations. (d) Most course students report large gains in their own productive, creative behavior; they rate the program as quite helpful in their other college courses and their everyday lives. In the second year, there is a significant increase in the percentage of students who report large gains in ability to cope with problems and to participate actively in discussions. (e) Test results bear out their significant year-to-year improvement over comparable controls. (f) Course students show a growing tendency (not yet attaining statistical significance) to become more productive than comparable controls in their non-academic achievement in areas calling for creative performance.

PROGRAM ACCEPTED BY COLLEGE

As a result of the encouraging findings, our Buffalo State University College has made the experimentally-designed four-semester program a regular part of the curriculum, offered now to all students as a series of interdepartmental general-liberal electives. Several students who completed the two-year sequence are now enrolled for advanced work in independent-study courses. They will be involved in projects such as the following:

- . . . research assistantships in continuing evaluations of courses and workshops;
- . . . joint projects with other academic departments, with opportunities to apply creative problem-solving to significant problems in the student's major field;
- . . . projects involving work with the *Journal of Creative Behavior;*
- . . . participation with elementary and secondary students in local schools, to develop creative problem-solving abilities among elementary and adolescent groups;
- . . . application of creative problem-solving to significant local problems through work with community organizations;

. . . teaching internships in Creative Studies classes and in the Annual Creative Problem-Solving Institutes.

ILLUSTRATIVE SUMMARY

Perhaps the best way to illustrate the development of the students in this unique educational program is to graph the results at the end of two years, for eight of the nine measures that showed significant differences in favor of the students completing four semesters of courses over comparable controls who did not take the program. The ninth measure was analyzed in a different manner from the other eight. It involved a problem of current concern to professional researchers. (See test number 19 on page 186.) The measure calls for a plan of action to be developed by the subjects. These plans were presented to two experienced researchers who independently grouped them into seven quality-ranks. The research staff then compared the percentages of course students and controls whose plans were rated below average with those whose plans were rated average or above. Whereas only 37 per cent of controls' plans were average or above, 73 per cent of the course-students' plans were found to have been so ranked. This difference in percentages was highly significant statistically.

The eight measures plotted and explained in Figure 1, plus the ninth just discussed but not graphed, represent 69 per cent of a total of 13 in the cognition, divergent-production, and convergent-production operations of the semantic and behavioral content-areas, where the significant accomplishments occurred.[1] On three of the other four such measures, the two-year course students excelled the controls but nonsignificantly; on the fourth, the two groups were equal.

The results are also graphed for the students who had dropped out after one, two and three semesters but who were also tested at the end of the second year of college. The differences are not necessarily significant between any two groups on the graph (indicated by duration of stay in program) other than between the four-semester students and the controls. The consistency of the slopes in the graph is, however, quite suggestive. Examples of test items are provided later in the article.

SOME STUDENT REACTIONS

Before elaborating on the details of the research, the nature of the tests, and so forth, let us give a few examples of how students describe their accomplishments in the program. Each of the following reactions is from a different student.

[1] Definitions of these terms from Guilford's Structure-of-Intellect are provided in Figure 2.

FIGURE 1 Some results of the two-year program.

At the final testing session of the two-year program, students who took all four semester-courses (E's) significantly out-performed comparable control students (C's) on all of the tests graphed on this page. Eight tests are shown. A ninth, where E's also significantly excelled C's, is not graphed, but was explained on the previous page.

The names of the eight graphed tests, described (by number) beginning on page 183, are as follows.

a — Utility (Fluency), No. 13

b — Problems in College, No. 15

c — Utility (Flexibility), No. 13

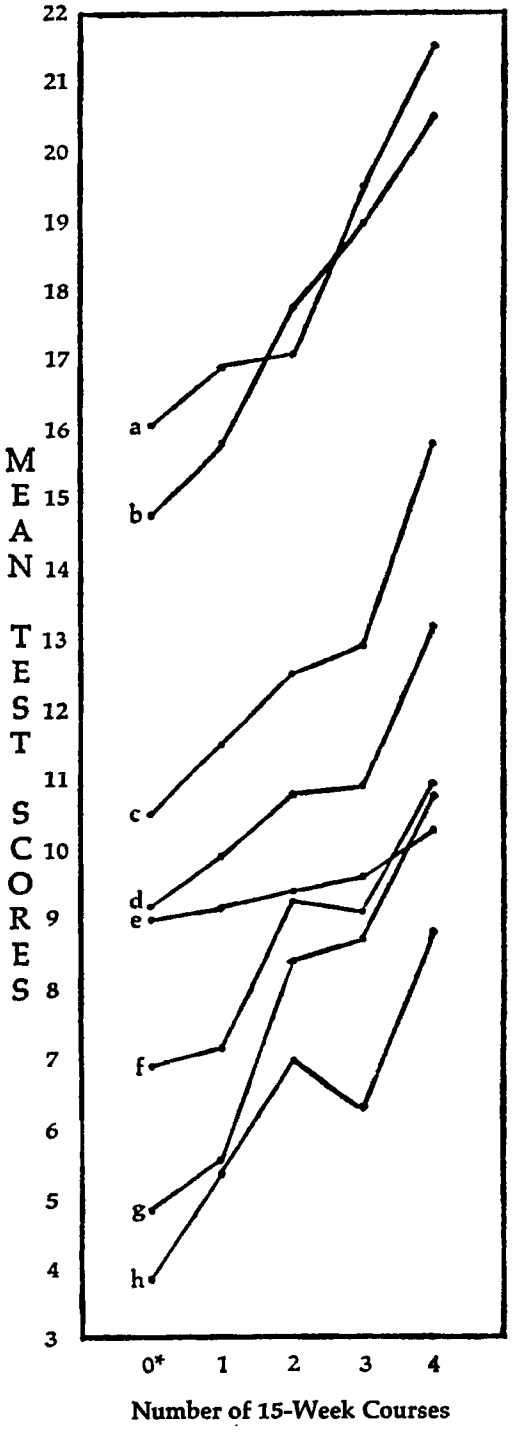
d — Problem Prevention, No. 16

e — Multiple Social Problems, No. 12

f — Evaluating Ideas, No. 14

g — Improving Research Testing — Part I, No. 17

h — Improving Research Testing — Part II: Making Decisions, No. 18



* Mean score for Control Group, who took no courses at all are shown as the starting points of the lines on this graph.

The following is one of the most revealing statements, illustrative of the frustrations along with the overall effects.

> Creative Studies always frustrates me every semester. In fact, I just feel like quitting the whole program. But when I look back I realize how much I have learned. The first year opened me up to thinking, exploring, creating, discussing — brought out in me an overall enthusiasm for learning. Already I can see the difference from some of the sessions we've done this year. Synectics has helped me to see problems in many different ways — something that in September I never thought would happen. I think in a more organized creative manner — I even record my ideas now — the thing I fought you the most on 1st semester. I never can really say until it's all over and I can look back and analyze the differences but I think that Creative Studies has helped me, more than any course I've ever had, to come up with more ideas and broaden my tolerance and appreciation for other ideas which at first glance I may have thought were of no value.

Another insightful reaction:

> Hi! It's funny how disillusioned I was with the course during the 1st semester. Then, near the end of it I began to see the results of the course on me — a definite more awareness to challenges, problems, and a better attitude towards life — enjoying and taking more time to enjoy nature, objects, sensations, and media . . . This semester I started writing poems which I never thought I could write. I wrote them when I was extra happy or extra depressed to express myself. I always felt good afterwards. Now I'm taking up photography. I intend to put poems and photos together in a scrapbook. I feel more confident and helpful when communicating with friends, etc. I can't see exactly how this course went about helping me to change for the better, but I know it has and I wouldn't drop the course. By my Junior year, I may transfer and lose 12 credits, but as my mother says — it may be the only REALLY worthwhile course I take. I agree. I wish there was a major offered in Creative Studies. I would definitely take it.

Many students discuss ways the courses help them in other subjects:

> . . . for one thing — the original principles of CPS had more of a chance to "sink in." The second semester helped me a great deal with the business I'm involved with. It also helped me to see where the other classes were going. Coherency became easier. Since experimentation was encouraged — I used more and more integration with my other subjects. I found this doubly rewarding.
>
> . . . before I never would have associated creativity with math, etc. It was really great the way we learned to use our creative abilities in a wide variety of situations, fields, and problems.

Attitudes and self-confidence are frequently stressed:

> . . . helped change my attitude to better regarding school, schoolmates, education as a whole — gives confidence to scared freshman.
>
> Made me happier and a great deal less fearful of society . . . How can I tell you of my change to independency, of assurance in new fields, of ability to concentrate and solve a problem, of the friends that I have made — of the complete change in my family . . . It is unbelievable in the change of my family. My mother would have told you herself, but you had to dash off.

The concept of "value with enjoyment" is frequently stressed:

> . . . the most exciting, challenging, hard, useful, course I shall ever take.
>
> . . . a valuable and enjoyable experience — which in school is usually a rough combination to find.

Many do not at first see the immediate applications in their lives:

> At first I really didn't think I would actually use what I learned, out of class, but I was wrong.

And others mention strong implications for the future:

> There are also many more things I have gained that I couldn't possibly evaluate at this point in my life. Someday, I'll tell you.

Some see it as a haven of relevance:

> The reason I am probably flunking out of college today is because I can't find enough relevance in my courses to justify putting any effort into them. Same old Bull Shit. Your class sort of served to salvage the

whole mess. I can now look upon my total college experience this far and feel that it had some value.

And many comments are made regarding expanded awareness:

This is just a sidelight but since taking this course I've taken an interest in other people. I find good things in everybody. I take interest in what they're doing whereas I used to not pay any attention.

. . . A lot of small things seem to have expanded lately — it's more apparent to me; things that I overlooked and took for granted before are things I would definitely be unhappy without; for example — a clear night in Buffalo. This seems to be very rare, but when it is clear I really get excited about it and go outside and look. I'm less afraid to let others know also. I guess I would have originally hesitated because I wouldn't want someone to think I was a nut. The other day J - - - and H - - - - and I were walking and it had been raining — out there was this one little patch of blue sky sticking through the clouds. Without worrying about their reactions, I pointed it out and they both smiled and said that it looked "cool," and J - - - said, "See, that's what that class does for you." He had noticed it also and was going to say something.

Not All React Positively

Do all students make these impressive gains and react positively to the program? The majority do; but definitely not all. For example:

One student after three semesters exploded:

It has led to total frustration for me and I've come to dread class every week. I don't enjoy this class anymore and I don't plan on taking it next semester.

Others were more insightful:

As yet I have not realized that it has done anything for me. However, eventually I may realize that it has helped. Sometimes things are not obvious right away. Hopefully the light will dawn soon.

I really don't feel it has done much for me at all. I've enjoyed the course and it makes you feel wanted knowing that at least two professors really care about you. At best it has opened my eyes a little.

GENERALIZABILITY OF RESULTS

What we have learned about the different types of students has been one of the most revealing aspects of the research project, and will be discussed fully in a later article regarding

the personality findings of the research and the generalizability of the results of the overall experiment. Suffice it to stress now that comparability of E's (experimental students) and C's (control students) who stayed with the program over the two full years remained the same, but that there is an attrition of almost 40 per cent at the end of each succeeding semester of the program and that many of these dropouts *are* a different kind of student.

Of course, there are diverse reasons, beyond personality differences, why students do not complete the sequence; they leave the College, have scheduling problems, and so forth. The following is a revealing comment:

> I used the Creative Studies method to solve my problem. The result I came up with was one I would never even think of before (due to what I was always told I should do). When I saw how this was the only answer that could make me happy and also would be worthwhile for me, it gave me the courage to make up my mind to act on my decision. And so I have decided to withdraw from school for awhile, until I decide what I want to do and then I will come back.

There are, however, significant and very interesting differences in personality between those who drop and those who stay through the sequence of courses. One area for future development is the designing of special programs to help the type of student who drops out. Much insight has been gained in this regard and will be discussed further in a later issue.

Approximately one-fourth of the students who elected to take the sequence of courses completed the full two years, with about 60 per cent completing the first year. Preliminary analysis of the data, along with data on non-volunteers for the experimental program, suggests that well over three-fourths of the College's incoming freshmen would be likely to profit from the courses.

DETAILED - RESEARCH INFORMATION[2]

The following information has been prepared for the serious general reader representing the total audience of the *Journal of Creative Behavior* rather than the research-scholar portion of our audience. Other articles are being prepared for the research scientist who is concerned with the full research design, the detailed statistical analyses, tables, and the like.

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[2] We wish to thank Hayne Reese for his consultation in the analysis and interpretation of the findings.

These articles will appear in other publications; appropriate references will be provided in future articles.

Hypotheses

The hypotheses tested in the current project are as follows: As a result of a four-semester sequence of Creative Studies courses, there will be significant differences, favoring those who have completed the sequence over those who have not, on: (1) selected tests of mental ability; (2) tests of creative application of academic subject matter; (3) non-academic achievement in areas calling for creative performance; (4) certain personality factors associated with creativity.

Experimental Design

The research sample was randomly selected from approximately 350 applicants for the Creative Studies program at Buffalo State University College. These applicants represented approximately 30 per cent of the total incoming freshmen group to whom the program had been offered.

From the total body of applicants, 150 were randomly placed in the experimental group — organized into six class sections — to receive the four semesters (15 weeks each) of Creative Studies courses; another 150 were randomly assigned to the control group (which was to receive no courses in Creative Studies until the conclusion of this two-year project). The purpose of the control group was to provide a base-line for differentiating between treatment effects and general growth and practice effects. All basic testing of E's and C's was done simultaneously on Saturdays or in late afternoons or evenings, when no classes were in session for any of the subjects. Some tests (of Hypothesis 2) were administered during class sessions in other courses (not Creative Studies). In these cases we used subsamples composed of all E's and C's who happened to be in the particular classes.

Scoring

Protocols were coded so that no rater knew whether he was rating the protocol of a control or an experimental subject. Reliability of raters was checked through applicable correlation coefficients between the scores of independent raters for all measures which required qualitative ratings. The reliabilities were acceptable: 39 were in the .90's; 9 were in the .80's; the remaining one was the only relatively low reliability — .65.

Analyses

As a principle, the random assignment of subjects to experimental and control groups was expected to eliminate group differences on the preliminary tests, including the Minnesota Multi-Phasic Personality Inventory administered to all incoming freshmen by the Counseling Center.

Guilford's Structure-of-Intellect (S-O-I) Model

Our creative problem-solving process parallels Guilford's model very closely (Guilford, 1967, 1969a, 1969b). While we talk about "fact-finding" and "problem-finding", Guilford

covers these processes in his first two operations, "cognition" and "memory"; our "idea-finding" parallels Guilford's operation of "divergent production"; and our "solution-finding" and "acceptance-finding" deal with processes similar to those in Guilford's "convergent production" and "evaluation." Hence, in our research design, we selected tests of each operation in Guilford's Structure-of-Intellect in order to determine which ones our courses are affecting. Most previous research has centered on divergent production, the operation most often associated with the word "creative." In our creative-studies model, however, "creative" is defined as a function of knowledge (cognition and memory), imagination (divergent production), and evaluation (convergent production and evaluation). Hence, our research is examining possible changes in all of these operations.

A total of 58 measures from Structure-of-Intellect tests were selected that seemed to have any possibility whatsoever of being affected by the training. Following consultation with Guilford, parts of tests were used rather than entire tests, in order to allow a greater range of testing within reasonable time limitations. Many of the test items were very questionably related to the training but were included in order to sample different aspects of the Structure. In choosing one of several measures within a particular cell of Guilford's model, we generally used the most highly recommended tests (Sheridan Psychological Services, circa 1969); in the few exceptions, we consulted with Guilford as to the reasonableness of our choice. We designed several tests ourselves to measure everyday problem-solving abilities rather than to measure any specific S-O-I cell. We discussed these in conferences with Guilford, who feels, as we do, that it is possible to hypothesize that the specially-developed tests are predominantly measuring certain S-O-I abilities where we have included them in our summaries. We will be able to check this by correlations we will run among the various tests. Thus we may be able to throw some further light on the S-O-I abilities as a result of these special measures of our educational program.[3]

[3] For those familiar with the Guilford model, the selected measures sample: (1) all content-areas except behavioral for the "cognition" operation in his Structure model; (2) the semantic area of the "memory" operation; (3) 19 of the 23 cells of the "divergent production" operation (there is nothing in Sheridan Psychological Services' summary report of recommended tests for the 24th cell — divergent production of figural relations); (4) the symbolic, semantic and behavioral areas of the "convergent production" operation, and (5) the symbolic and semantic areas of the "evaluation" operation.

Preliminary tests were given from all five operations in Guilford's intellectual model. Inasmuch as our courses provide no "memory training," we hypothesized no changes in this one operation—unless it should come about as a result of students' invention of more effective ways to remember things, just as they learn to invent diverse ways to do anything. This, however, was not expected. Similarly, we did not hypothesize any changes in the type of evaluation processes measured by the S-O-I tests used, although we did hypothesize changes in the ability to develop evaluative *criteria*, an ability that Guilford hypothesizes would fall under cognition or divergent production, and in ability to decide on a plan of action, an ability that Guilford hypothesizes would come under convergent production.

Findings: Mental Ability and Related Measures

Preliminary Tests.

On all 13 ability tests, there were no significant differences between subjects assigned to the experimental and control groups. Furthermore, the means for the experimental group were *lower* than for the control group on 9 of the 13 tests, indicating that, if anything, there was somewhat greater ability in the control subjects than in the experimental subjects. The initial performance of the E's and C's tested each semester was analyzed and found to remain comparable throughout the experiment. There was only one instance out of 52 where a significant difference occurred in pre-test comparability.

Post-tests.

The findings that follow cover the results for all four of the major post-testing periods.

On all but three of the 27 semantic tests used, the E's were superior to the C's, significantly so on 16. Two others were equal, with the third favoring the C's but nonsignificantly.

In the behavioral area, the E's outperformed the C's on eight of nine tests, significantly on four. The one where C's excelled E's was again nonsignificant.

None of the eight figural tests showed significant differences, with six being slightly in favor of the E's and two slightly in favor of the C's.

On seven symbolic tests, three differences favored the E's and four the C's, with no significance on any of the seven. One additional symbolic test was included among the special tests given to subsamples of E's and C's in English classes. On that test, E's significantly outperformed C's. Specially designed pilot-tests involving symbolic material have also been given in the math area, and will be scored and analyzed next year.

It is worthwhile to analyze the data for the semantic and behavioral content-areas and for the three operations where the significant results occurred during the two years of post-testing. Figure 2 presents a summary of this specific data. Guilford's explanations of terms are provided. (As explained above, no tests—except the one special test given to the sub-sample—were significant in the symbolic or figural content-areas.) Ten tests of *cognition* were administered. Seven showed significant differences in favor of the experimental subjects, with the other three in the same direction. In the area of *divergent production*, 14 tests were administered. Nine of these tests showed significant differences in favor of the E's, with four of the other five in the same direction. The one where C's were greater was nonsignificant. Eight tests of *convergent production* were administered. The E's were significantly superior to the C's on four tests, ahead on three others and equal on one.

In the *evaluation* category, three tests were administered. Two of the tests showed nonsignificant differences in favor of the E's. On the third test, both groups were equal. Two other tests were given where E's significantly outperformed C's on the ability to generate multiple criteria for evaluating ideas. However, these two tests were included under the cognition and divergent-production areas because Guilford hypothesized, in informal conferences with the senior author, that these two would fall under those operations rather than under evaluation. He pointed out that they measure the generation of products rather than the actual judging itself. In our own model, the criteria-generation stage is a vital part of the total evaluation process. The actual judging itself, wherein the criteria are applied, is included, in our model, in the convergent-production processes where decisions are made and plans of action are produced by the subjects.

Only one *memory* test was given in the two years of the follow-up testing. No difference was hypothesized and no significant difference occurred.

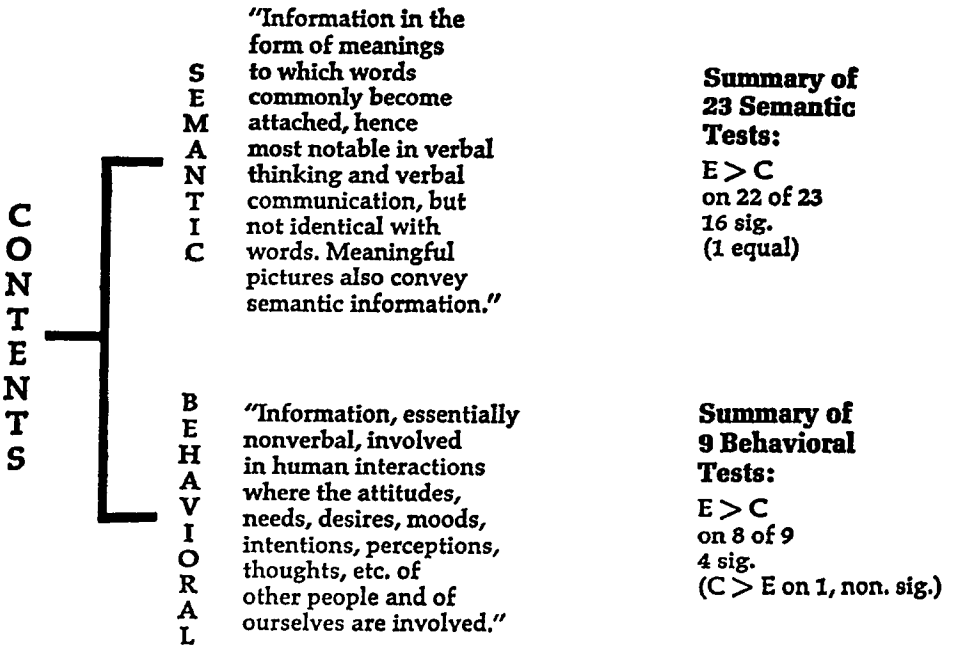
Similarity of Test Results and Student Perceptions.

The two of the three "operation" areas where the E's excelled most (cognition and divergent-production) are the same as the top two categories of *perceived* gain by the course students. On a questionnaire at the end of the second semester, course students were given 13 areas of possible gain from the course, with instructions to indicate their gain on a five-point scale: "not at all," "very little," "somewhat," "a good deal,"

FIGURE 2 S-O-I Intellectual operations where E's showed significant differences over C's in the four Post-Testing sessions . . . Guilford's (1969) definitions of terms provided.

"Contents are broad classes or types of information; information classified according to its substantive nature."

"Operations are the major kinds of intellectual activities or processes; things that the organism does with the raw materials of information. Information is defined as that which the organism discriminates."



Summary of 32 Tests:
E > C on 30, 20 sig.
E = C on 1
C > E on 1, non-sig.

OPERATIONS

COGNITION	DIVERGENT PRODUCTION	CONVERGENT PRODUCTION
E > C 10 of 10; 7 sig. "Immediate discovery, awareness, rediscovery, or recognition of particular items of information; understanding or comprehension."	E > C 13 of 14; 9 sig. "Generation of information from given information, where the emphasis is upon variety and quantity of output from the same source; a search for logical alternatives."	E > 7 of 8; 4 sig. (1 equal) "Generation of information from given information, where the needed information is fully determined by the given information; a search for logical imperatives."
E > C on 10 of 10 7 sig.	E > C on 7 of 7 6 sig.	E > C on 5 of 6 3 sig. (1 equal)
Not Tested	E > C on 6 of 7 3 sig. (C > E on 1, non-sig.)	E > C on 2 of 2 1 sig.

"a great deal." The students gave the highest ratings to "take more factors into consideration in making decisions" (88 per cent of students checking "good deal" or "great deal"), and "more prone to try different approaches" (83 per cent of students checking "good deal" or "great deal"). These appear to us to relate very closely to the Guilford processes of cognition and divergent production, respectively.

Students were apparently not indiscriminately high in their ratings on the questionnaire, for the percentages of students checking "good deal" or "great deal" for any particular item ranged from a high of 88 per cent, mentioned above, to a low of 15 per cent. The other areas where 60 per cent or more of the students indicated a good deal or great deal of gain from the course were as follows: exert more effort in mental tasks, not quitting so soon (71 per cent); better able to evaluate ideas (66 per cent); more open-minded to ideas of others (64 per cent); better able to develop ideas and put them to use (60 per cent).

Significant Growth in Perceived Gain.

In the area of lowest perceived gain at the end of the first year—"participate more actively in discussions"—29 per cent more students indicated a good deal or great deal of gain at the end of two years than at the end of the first year. This was one of the largest growth-items in the second year. This item and "better able to cope with problems"—up from 55 per cent checking "good deal" or "great deal" in the first year to 81 per cent the second year—were the two largest gains from year one to year two, both significant.

Further Evidence of Value of Second Year.

A question which was raised repeatedly concerned whether or not the second year adds anything to the benefit from a single year. Figure 1 on page 167 offers some answers to this question. So do the students' written comments. A more definitive answer is provided by the following, as well as by the students' own significant changes in their perceptions of gains from first year to second year (mentioned above). Three tests (one in each of the three operations where significant differences were found) were repeated in identical form in the pre-tests and in each subsequent year: (1) one on divergent production of behavioral implications; (2) one on convergent production of semantic systems; (3) one on cognition of semantic implications. None showed any significant differences between E's and C's in pre-tests. In the first two cases, E's were slightly greater than C's in the pre-tests on one, and C's

slightly greater than E's on the other. In the first year E's were greater than C's on both, but not significantly so on either. In the second year, however, E's surpassed C's significantly on both. In the third case, E's were slightly greater than C's on the pre-test, significantly greater in year one and, again, significantly greater in year two. However, the difference between the *differences* of year one and year two was also significant, in favor of year two.

Findings: Academic Achievement (English Subsample)

Analyses were made of English test data for the subsample of E's and C's who were tested by their English instructors in English classes, using English-related creativity tests that were disassociated from the Creative Studies Project. Two out of five tests showed significant results, with the other three in the same directon, all favoring E's.

A sixth test involved writing of an English theme on a topic allowing a good deal of creativity. These themes were graded in the usual way by each student's English instructor. No significant difference occurred on the grades. It is noteworthy, however, that the E's with their course emphasis on imagination did not suffer in their overall theme performance, as some feared, especially at the hands of an "unappreciative instructor." As a matter of fact, there was a slight tendency here again for E's to surpass the C's.

Regarding comparability of E's and C's who formed the subsample for this set of tests, there were no significant differences on: (1) the pre-tests of mental ability, (2) pre-entrance scores on English achievement in the New York State Regents Scholarship Examination, and (3) pre-entrance self-reports related to general academic achievement.

Compared with a second control group, those who did not volunteer for the experiment (not an equivalent population, but nonvolunteers who happened to be in English classes along with the subsample of Experimental and Control subjects of the overall experiment), the E's were *significantly* stronger than the nonvolunteers on five tests, all except the English theme. The volunteer Controls were also superior to the nonvolunteers, but significantly only on one of the five tests.

Pilot work with further tests given in English classes shows the E's again outperforming the control groups mentioned above; however this data has not yet been fully analyzed for statistical significance.

Findings: Non-academic Achievement

The following areas from the American College Survey (1965) (Richards, Holland and Lutz, 1966) were surveyed by self-report: leadership, social participation, art, social service, science, business, humanistic-cultural activities, religious ser-

vice, music, writing, social science, and speech-drama. The majority of our subjects (E's and C's) did not attain even one-tenth of the total of 120 possible points on this scale. The accomplishments generally take considerable time or effort. Hence, growth on this measure is expected to be quite slow. At the end of two years of courses, E's showed a growing tendency, not yet significant, to surpass C's. Thirty-nine per cent of the E's made total scores of 15 and above, compared to only 23 per cent of the C's.

It is interesting to note, when examining the first year's scores on this instrument for the same experimental and control subjects discussed above, that only 21 per cent of E's and 16 per cent of C's scored 15 or over. The 5-point difference in percentages was not significant. The higher difference of 16 per cent (between the 39 per cent for E's and 23 per cent for C's) at the end of the second year also fell short of reaching significance. Because of the encouraging trend toward more productive real-life achievement of experimental subjects who continue through the Creative Studies program, we intend to repeat this instrument at the end of the third and fourth years of the subjects' college careers to see if the trend becomes significant. Regarding comparability of E's and C's on this particular test of non-academic achievement, the Alpha Biographical Inventory (IBRIC, 1968) was given as a pre-test. It is probably the most comprehensive and well-researched instrument for measuring this kind of achievement. The two-year course students and their controls were within less than half a per cent of one another in the pre-test on this measure—obviously nonsignificant.

Findings: Personality

As mentioned earlier, the personality findings will be discussed in a later article, as well as the generalizability of results.

Career Competition

Not as a formal part of the experiment, but as a pilot study, all experimental and control students who had completed the five testing sessions (the pre-test and those at the end of each of the four semesters) were offered the following challenge:

> A number of volunteer consultants to the National Advisory Committee of our Creative Studies Project have expressed, in a concrete way, their deep interest in encouraging creative people to apply their creative potential as fully as possible. These consultants, who are themselves highly creative people established in their professional fields, have offered awards totaling $500 for a creative competition of an applied nature.

Sizes of Awards. Eight awards are offered as follows:

First Award	— $150
Second Award	— 100
Third Award	— 75
Fourth and Fifth Awards	— 50 each
Sixth, Seventh and Eighth Awards	— 25 each

Each award will be accompanied by a letter of commendation. Furthermore, each additional outstanding entry will merit a letter of honorable mention. (The donors have also pledged an additional $500 for next year's competitive awards.)

Nature of Competition. The challenge for the competition is the following:

> How would you go about entering the kind of a career that is likely to tap most fully your creative potential? How would you go about convincing the appropriate decision-makers (employers, individuals or organizations) of your creative potential in that career?

There are no restrictions on the format of the entry.

The idea for the competition was conceived too late to be implemented as effectively as desired. It had to be given just before final exams—hardly the time to expect maximum attention or extended effort to a new challenge that was incidental to the pressures of the moment. Still, the idea itself seemed worth mentioning, especially inasmuch as we intend to run a more realistic competition next year, over a longer time period. Under the circumstances described, the number of entries this year was only 13 out of 158 eligible. Nevertheless, it is noteworthy that 12 were E's and one was a C. The contest was *never* mentioned or discussed during Creative Studies classes. All notifications and reminders were delivered to E's and C's alike, in writing. The first five winners were experimentals; one of the last three was the control subject. Obviously, the raters had only a code number for identification, thus insuring no possible bias.

The results reported above would appear to represent minimal estimates of the differences between course students and their comparable controls for the following reasons: (1) There was a large amount of interaction and discussion between E's and C's. Over two-thirds of the controls acknowledged having discussed the course materials with the experimental subjects, with a dozen indicating that they had actually *studied* course materials. Considering this, the results obtained are even more

impressive. The situation was unavoidable, since about half of the subjects live in dormitories. It could be avoided only by using different universities for experimental and control groups, but the cost would be a possible loss of comparability of backgrounds. (2) Experimental subjects reported frequently that they couldn't write fast enough in timed fluency tests in the post-testing periods, but that they had not experienced this in the pre-tests.

TEST INSTRUMENTS

It is important to note that the tests used in the evaluation of the Creative Studies courses were not tests in the usual sense, constructed around the language of the course. Because of the wide variety of tests used, most of them required considerable transfer from the kinds of exercises and materials the students used in the classes. An examination of the material in the *Creative Behavior Guidebook* (Parnes, 1967) and the *Creative Behavior Workbook* (Parnes, 1967), when compared with the tests given, will readily show that the training was not designed to "teach the tests." Fundamental principles of problem-solving were emphasized and *practiced* extensively throughout the course, and the results show that these principles may be applied in a variety of tests that require a particular type of thinking, but not in the same way in which it was taught.

An example may make the point quite clearly: Students, basically, are taught to be able to associate aspects of their knowledge and experience more readily in order to find meaningful relationships in that knowledge. They are not taught specifically, however, how to think of the multiple meanings in particular words. Yet in tests of this skill, experimental students did significantly better than control students in the first year of the program. Another example, along quite different lines from discovering alternate meanings of words, is the test called "Procedure Applications." In this test, students are given, for example, a chemical procedure, and asked to find applications of that procedure in other facets of life. Here, too, the experimental students significantly outperformed the controls by the second year of the Creative Studies courses.

To cite an example of a test that is *closest* to what is taught in the classes, we would name the Utility Test (listing other uses for a common object such as a rubber band). This test measures fluency and spontaneous flexibility. In this test, large gains would be expected and are typically found in students who have been exposed to courses in Creative Studies. Most of the tests used in the experiment, however, were a far cry from the kind of test that asks for "other uses for an object." *None* of the tests called for pure *recall* of knowledge. *All* of

the tests called for *utilization* of knowledge in a wide variety of increasingly difficult mental tasks, none of which had been specifically presented anywhere in the courses.

EXAMPLES OF TEST ITEMS

The following are examples of items from the tests on which experimental subjects significantly outperformed controls. Each example is excerpted from the cover (instruction) page of the test. "G" next to a test number indicates that the test was developed in Guilford's laboratories. Information on those tests and their availability may be obtained from Sheridan Psychological Services, Inc., P. O. Box 837, Beverly Hills, California, 90213. "B" next to a test number indicates that the test was developed in our Buffalo laboratories. Those tests are not available in published form. "S" next to test number 4 indicates that this test was developed in the psychological laboratories at State University of New York at Stony Brook by psychologists Marvin Goldfried and Thomas D'Zurilla.

(G) 1. Seeing Different Meanings

"In this test each given word has a number of different possible meanings. Your task is to think of as many different meanings of each given word as you can."

SAMPLE WORD: Scale

(B) 2. Rhyming Words

"On the following pages you are to list words that rhyme with the words shown."

SAMPLE WORD: Spoon

(This test is an adaptation of Guilford's test called "Rhymes.")

(G) 3. Possible Jobs

"As the Inter-Planet Express prepared to land on Mars, the tourists were discussing a new custom developed by the Martians. Since the first settlers had arrived from earth, the Martians had taken to wearing emblems to show what each person's job is.

"As the tourists looked through the videoscope, they saw one Martian wearing the emblem shown below. (Line drawing of a shining light bulb within a circle.)

'Electrical engineer,' said one of the tourists. 'Light bulb manufacturer,' said another. 'Maybe a bright student,' a third tourist suggested.

"In this test you will see more of the emblems that the Martians wore. Imagine that you are one of the tourists. Think of as many possible jobs as you can which might be indicated by the emblems. If you are not sure whether one of your ideas is reasonable, write it down anyway and try to think of another idea."

(S) 4. Stony Brook Coping Problems

"As you read the situation, we would like you to imagine that you are now in this situation. When you have the situation clearly in mind, think of how you are *most likely* to react in such a situation. Then in the space below the situation, write down your *total reaction* in specific detail."

SAMPLE SITUATION:

"It is about a month after the start of classes during your first semester, and several important examinations have been scheduled for the same week. The examination for your most difficult course has been scheduled for late Wednesday afternoon.

"You are having breakfast on Wednesday morning, the day of your most difficult exam. You feel that you are inadequately prepared, and your full schedule of classes for Wednesday does not allow time for further studying before the exam."

(G) 5. Alternate Uses

"In this test, you will be asked to consider some common objects. Each object has a common use, which will be stated. You are to list as many as six other uses for which the object or parts of the object could serve."

SAMPLE ITEM: A Newspaper (used for reading)

(G) 6. Apparatus Test

"In this test you will be given names of objects that are familiar to everyone. Your task is to suggest two improvements for each of the objects. Do not suggest an improvement that has already been made. You do not need to worry about your ideas being possible, so long as they are sensible.

"It is not necessary to explain your reason for a suggested improvement. Your suggestions should be specific. A suggested improvement like 'The object should be made more efficient,' is too general to be acceptable.

"You are to write two improvements for each object in this test. If you have difficulty with an item, do not spend too much time on it, but go on to the next item. Do not suggest similar improvements for two or more items, because duplications will not be counted."

SAMPLE ITEM: Telephone

(G) 7. Alternate Methods

"A house located near a stream is on fire. Twenty men, each carrying a bucket, arrive to help put out the fire. The house is about 20 yards from the stream. In how many ways could you organize this bucket brigade to deal with the fire?"

(G) 8. Alternate Picture Meanings

"Facial expressions and gestures can have many different meanings. Each item in this test is a picture of a facial expression or a gesture. You are to look at the picture and then write as many *different* things as you can that a person might say if he felt as the person in the picture does."

(Line drawing of a person holding hand to face.)

(B) 9. Problems with Educational System

"List below problems you see with our educational system. Do not discuss or solve these problems. Just *list* as many problems as you can think of."

(G) 10. Pertinent Questions

"A student who has graduated from college is offered positions in the same occupation but in different parts of the country. What four questions have to be considered in making a choice?"

(G) 11. Procedure Applications

"In chemistry, one of the methods for getting a pure sample of some substance is by successive crystallizations. The substance is first put into solution, then crystallized out. This removes some impurities. The process is repeated several times; each crystallization removes additional impurities until only the pure substance is left.

"If we think of this method in the general sense of refining or purifying by repeating a process, in what other instances might this method be used?"

(G) 12. Multiple Social Problems

"In each item of this test, two people of a typical family are described. You are to write as many different personal problems as you can that the two people can have with *each other*. The problem should involve the feelings, thoughts, and attitudes of the two people described. Look at the sample item:

"What personal problems can the *BROTHER* and *SISTER* have with each other?"

(G) 13. Utility

"List as many uses as you can think of for a *rubber-band*."

(B) 14. Evaluating Ideas

"List factors which you might take into consideration in evaluating the 'uses' that you gave on the previous test, assuming that you were trying to decide which were the best ideas for actual use. Do not tell which idea you would select; simply list *considerations* which might enter into your decision, assuming you would make some use of the objects. If helpful, you may look back at the uses you gave on the previous test."

(B) 15. Problems in College

"List problems which you think a student may face in college. Do not discuss or solve the problem; just *list* as many different ones as you can think of."

(B) 16. Problem Prevention

"Regarding the problems you listed on the previous test, suggest, briefly, ways that incoming freshmen might minimize those problems or prevent them entirely from occurring."

(B) 17. Improving Research Testing, Part I

"Many educational experiments are conducted in which volunteer subjects like yourselves are brought together for testing sessions such as this one. Researchers are extremely interested in ideas for improving such testing operations. Our Creative Studies staff and others in the College are anxious to obtain as many suggestions as possible from Project participants as to how these testing-sessions could be improved for the benefit of future subjects and researchers at our College.

"There are 3 parts to this test. You will be asked first for ideas, then for considerations for judging the ideas, and

finally for a detailed plan based on your best ideas. "List as many ideas as you can in which this overall testing operation (which consisted of 5 testing periods from September, 1970 until now) could be improved."

(B) 18. Improving Research Testing, Part II; Making Decisions

"Regarding your ideas on the problem of improving this overall testing operation, list below as many factors as you can think of that might be taken into consideration in trying to decide which of your ideas are the best. You may look back at your ideas if you like. Do *not* decide here; simply list factors you might consider *in* deciding."

(B) 19. Improving Research Testing, Part III; Developing Plans

"Based on the factors you listed in Part II, choose your best idea or combination of ideas from those you listed for improving this overall testing operation. State below; then develop the best plan you can for implementing the idea(s) — for spelling out how it could be developed and used."

Chosen Idea(s):

Plan for implementation:

COMING ARTICLES

The next article will discuss in detail the complete program for the four semester-courses, to be followed in the subsequent article by the full report regarding personality measures, the nature of the dropouts from the program, and the generalizability of the results.

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