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Jesuit Educational Quarterly

MARCH 1960

LOYOLA COLLEGE OF MUSIC

LIBERAL EDUCATION IN THE PROFESSIONS

ETHICS IN THE COLLEGE CURRICULUM

CREATIVE LEARNING

A NEW HIGH SCHOOL PHYSICS COURSE

STATUS OF SPECIAL STUDIES

NEWS FROM THE FIELD

Vol. XXII, No. 4

(FOR PRIVATE CIRCULATION)

Our Contributors

Probably many of our JEQ readers did not know that there was a full fledged school of music in an American Jesuit University. FATHER CLEMENT J. McNASPY is well qualified to head the School of Music with a Doctorate in Musicology, studies at Oxford, Montreal, St. Louis; archdiocesan music commission; Director of Gregorian Institute Summer Session at Solesmes.

FATHER EDWARD A. JARVIS, S.J. is chairman of the department of Philosophy at the University of Scranton. As his article indicates, he is somewhat mid-way between the opinions of FATHER LEARY and FATHER SPONGA.

MR. EDWARD J. LAVIN, S.J. is a New York theologian in his third year at Woodstock College. The interest in Fine Arts in evidence in Mr. Lavin's JEQ article has had its fruition in the preparation of an excellent syllabus for the teaching of Fine Arts in the high school curriculum.

FATHER FREDERICK L. CANAVAN, S.J. and FATHER JOSEPH F. MULLIGAN, S.J., who crusade for the introduction of the PSSC course in Physics for Jesuit high schools, are faculty members of the Physics department at Fordham University.

Jesuit Educational Quarterly

March 1960

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JESUIT EDUCATIONAL QUARTERLY

Loyola College of Music

C. J. McNASPY, S.J.

Unique in the American Assistency, and possibly in the whole Society, is the College of Music of Loyola University, New Orleans. A member of the National Association of Schools of Music, Loyola's College of Music offers four-year courses leading to the degree of Bachelor of Music in Composition, Voice, Piano, Piano Pedagogy, Instruments, Organ, Liturgical Music, and Music Therapy; and courses leading to the degree of Bachelor of Music Education with majors in Voice, Piano, or Instruments.

The origin of the College of Music is more or less what one might have expected: it preexisted and then became affiliated with Loyola University. Founded as the New Orleans Conservatory of Music and Dramatic Art in 1919, the College of Music became a part of Loyola in September, 1932. The faculty included a number of the leading music teachers of New Orleans. The founder and first dean was Dr. Ernest E. Schuyten.

The focus of interest has varied somewhat from decade to decade. In line with the operatic tradition of New Orleans, opera has generally had a prominent part in the College. A number of singers who have made their mark in New York and New Orleans opera were trained at Loyola: Charles Caruso, Marguerite Piazza, Norman Treigle, Audrey Schuh, Barbara Faulkner, and many others. The Opera Workshop, last year alone, produced entire scenes from nineteen grand operas, in both the original languages and English. Our students also performed four complete operas during the one academic year.

For the past several years, however, interest has tended more toward the instrumental field. Our brass and woodwind ensembles gave sixty-one public performances last year, with programs ranging from Gabrieli to Vaughan-Williams, from Purcell to Progressive Jazz. One of our piano professors, an internationally famous recording artist, gives a regular weekly television program, and generally there is great competition among our piano students. Two of our professors have given public concerts covering all the organ and keyboard works of Bach, again during the past academic year. This has helped the entire University prestigewise.

Another recent development is in the field of Music Therapy. This year the University hosted the Southeastern Regional Conference of the

National Association for Music Therapy. One of our professors has just published a training manual for students in Music Therapy which has been distributed to music schools all over the country and evoked enthusiastic comment. The University has useful contacts with city and state hospitals, providing opportunity for laboratory and internship in Music Therapy.

Perhaps most significant in terms of Jesuit education is the newly established department of liturgical music. Thanks to a twenty thousand dollar grant, we were able to inaugurate a complete program in liturgy, chant, polyphony, and organ, this past summer. Some seventy students, including priests, nuns, brothers, and lay people, enrolled in the course. While it is desirable for students to be engaged in this work throughout the school year, we have arranged the degree program so that teachers who can come only to summer sessions may obtain the degree in from six to eight summers. Our chant and polyphony professors have studied at Solesmes, at the Pontifical Academy in Rome, and at American universities. Our organ instructors have done very advanced postgraduate work under Helmut Walcha and Germani. Our academic standards are geared to the highest requirements, and the reaction of music critics to the concert given the first summer session suggests that good results are being achieved.

Music Education will probably become the college's largest department. Most of the band directors and other music teachers of the area have been trained here, and the demand for trained musicians in these fields continues to be much larger than the supply.

It will probably be a year or two before we can venture into graduate work. Demands have been increasing, especially for advanced degree work in liturgical music, in piano, and in other orchestral instruments. Members of the New Orleans Philharmonic are instructors in these instruments, and the full-time professors can provide advanced courses. The principal need at present is for a larger library for research.

Among plans for the immediate future are a series of seven recitals including all of Beethoven's sonatas, another series of organ recitals, an expansion of brass ensemble and opera work, workshops on Saturdays for high school students.

Integrated into the music curriculum are, of course, the traditional Jesuit core subjects, philosophy and theology. Our students have Jesuit teachers in these and several other academic courses. Music orientation for all students, music history, and music workshop are under the direction of a Jesuit, and the Sodality of St. Cecilia has the chaplain of the college for moderator. It is made very clear to students that they are not

merely professional musicians but are expected to become fully formed Christians. With the phenomenal growth of music in the life of America, we feel that a Jesuit college of music has an essential role to play in the twentieth century.

BASIC ENGLISH

The *Armed Forces Writer* quotes a report by a nineteen-year-old airman that should startle even a calloused teacher of English:

"I, (name deleted), will on duddy on the 20 Sept. 1957 at approx 2255 I was walking post 6 witch is loketed on the south side of the matence hanger at the south end of the parkind airia. I was woking est by the wase of the paved at approx the senter of the parkind airia when a radil snack sounded his worning. I druw my weppen and fired. As I fired I jumped back and rain tword the planes to avoid a strick from the snack. After I comed down I whent back to the end of the ramp to check the damage. The snack was gone so I looked for the brass and cleared my weppnen."

EARMARKS OF A GOOD TEACHER*

1. He *likes* his work, even the drudgery of it, in the conviction that it benefits his students.

2. He likes his students and takes *pleasure* in seeing them mature month by month.

3. He prefers to be *popular* with his students four years after they have tested his teaching rather than while they have been exposed to it. But he affords his students all the fun of learning they can get.

4. He keeps *adjusting* his teaching to the changing needs of his students, distinguishing between one individual and another, one class and another, and between students of five years ago, now, and five years hence.

5. He has a passion for *fundamentals*, but without being jejune. He knows well, "These things they ought to have done, and not left those undone."

6. He teaches the *subject assigned*, not other subjects; but he also makes occasional references to related areas of knowledge. He teaches his subject so as to open it up, not close it, to his students.

7. He teaches his students not only "to think," but to read, to write, to speak. He is an auxiliary member of the Department of English. He foregoes rationalizations of why he cannot attend to these needs; he gets down to work and meets them.

8. He puts the *classroom first*, but sees as well the importance of extra-class life. He shoulders his share of activities but puts the emphasis only on those that are worth while.

9. He imparts intellectual formation with proper emphasis on character formation. He teaches form with content; he develops the reason, imagination, and memory, and stores them with a substantial body of knowledge to reason on. He finds room for principles and facts, for doctrine and experience, for past and present, for divine and human. He is big enough to see the *whole* of the educational process, not merely one or other of its parts.

10. He *teaches*, and nothing can stop him from teaching. He does not complain about what the high school should have taught. All he asks is to have a class of students, to have time to teach them, time to prepare his classes and correct the papers he assigns, and reasonable cooperation from the bookstore and library. He does his job; he teaches.

—An Anonymous Jesuit

* From Boston College Faculty News Letter.

Liberal Education in the Professions

EARL J. McGRATH

*Summary and Conclusions**

International and domestic events make timely a reexamination of the purposes and the character of professional and of liberal education, and the relationships between them.

Liberal education today can only be understood in terms of its historical development as an aspect of Western culture. A review of this history shows that liberal education has not been an immutable cultural entity but, on the contrary, through the ages has undergone radical change in purposes, content, method, and clientele, the process of change accelerating swiftly in the United States during the past seventy-five years.

The purposes and content of liberal education—in practice, if not in theory—have been extended to include a wide range of professional, semiprofessional, and other vocational instruction. These developments, often unobserved, make timely a reexamination of the relationships of professional to liberal education.

A realistic review of the place of liberal education in American culture shows that its value can no longer be assessed in terms of a specific content or disciplines arranged in particular patterns or sequences. The major outcomes of liberal education—knowledge, intellectual skills, and an integrated and self-directed personality—are only achieved when these goals are clearly visualized and actually incorporated in the learning situation. If they guide the teaching process, these objectives can be reached as readily in the study of professional subjects as in the traditional liberal arts discipline.

The ancient professions of medicine, law, theology, and teaching, which for many years have required formal higher education as a condition of membership, have in the United States now been joined by a host

* This summary is the final three pages of a sixty page report prepared by Dr. Earl J. McGrath and reprinted with his permission. The Institute of Higher Education is now completing a study of the liberal education elements in the total programs of students in eight varieties of professional schools. Our summary is taken from the third report representing *Liberal Education in the Professions*. The first two reports are: *Are Liberal Arts Colleges Becoming Professional Schools?* and *The Liberal Arts as Viewed by Faculty Members in Professional Schools*. Reports are published by the Institute of Higher Education, Teachers College, Columbia University, New York City.

of other callings, such as pharmacy, nursing, business administration, and journalism. Special curricula have been designed to serve their educational needs. The number of occupations claiming professional status will increase in the future, and it may be expected that educational programs will be developed to provide the appropriate training.

More than half of the first undergraduate degrees now awarded in the United States go to students in professional schools. The percentage in these categories will increase in the future. If these students are to have a liberal education, instruction must be shaped to that end.

The meaning of "professional" is not entirely clear, and no precise definition is at present possible. The economic, educational, and social factors which influence professional status in the public mind are complex and interrelated; but that the amount and kind of education—both general and technical—required of the prospective members of a particular occupational group determine its social status is incontestable.

The education of the various professions has evolved through five rather clear though not discontinuous steps from the apprenticeship, the first and primitive stage, to university training, the most advanced stage of development involving both considerable technical and general education. Some of the occupations which have only recently claimed professional status—for example, business management—exhibit all five stages of education among their membership. All groups, however, appear to be moving at varying speeds toward the dual goals of general education for citizenship and for professional competence. In the future to a greater degree than at present it may be expected that the professions which reach high social status and acceptance as preferred occupations will be those which prepare their members, not only for the specific responsibilities of their calling, but also for the more inclusive activities of civic and personal life. The history of education among the older professional groups can be of considerable benefit to occupational groups now seeking a clear and generally accepted standing as professions.

In the abstract, liberal education today has three dominant purposes: to instill knowledge; to cultivate intellectual skills; and to nurture the traits of personality and character basic to a reasoned and responsible life. The emphasis in the teaching profession since the breakup of the standard liberal arts curriculum of the late nineteenth century, occasioned by the growth of specialized knowledge and the growing dominance of graduate education, has been increasingly placed on the first of these objectives, that is, on the creation and dissemination of knowledge.

If this and succeeding generations are to be prepared to live intelligent lives, confident of their own judgments, and dedicated to the improve-

ment of the human lot, greater stress must be placed in undergraduate professional schools and in liberal arts colleges on the two other major purposes of higher education—the cultivation of intellectual skills and the development of a reasoned outlook on life motivated by the highest ideals of human conduct.

Since most students in undergraduate professional schools will not attend liberal arts colleges for any part of their higher education, these three major aims of liberal education must be included within the overall objectives of professional education. The graduate of a professional school (or of a liberal arts college) which provides little or no education other than that related to technical competence is at best an intellectually limited individual. The very character of his higher education will consign such a person to a lower level of social incompetence and personal development.

To achieve all three major goals of liberal education professional education ought to be reexamined to determine whether the present curricula, excessively burdened as most of them are with highly technical subject matter, are for that reason (1) failing to provide the broad technical education needed in the increasingly complex activities of professional practice; (2) neglecting to provide the rounded general education required by all who occupy positions in society reserved for those with higher education; (3) unwittingly causing students to believe that the narrow educational programs they have completed have prepared them for the further professional and personal growth essential to continued success as workers, as citizens, and as persons.

Programs in professional schools ought to integrate technical and general education in the sequence of studies extending throughout the period of higher education, and the purposes of liberal education ought in part to determine the selection of subject matter, classroom practices, and evaluating procedures.

The same broad purposes ought to prevail in liberal arts colleges, which through the excessive proliferation of specialized courses have in the main become hardly less preoccupied with the cultivation of occupational skills than their counterparts in professional education. The differences in the emphasis placed on the three major outcomes of liberal education described in this monograph are as great among liberal arts institutions as among professional schools. The question may well be raised whether the invidious distinctions between liberal and professional education should not now be abandoned. Higher education could then be recognized, as it should be, as having certain universal functions which should be common to all curricula regardless of the administrative

divisions which for convenience now separate undergraduate students in terms of their vocational objectives.

In any event, if the statements of the educators concerned can be taken at face value, there is now an intense interest in enlarging the scope of professional education to include more instruction not directly related to a specific occupation. It is their wish, too, to broaden professional studies by shifting emphasis in such instruction from facts and ready-made procedures to principles and the skills of applying them to the ever changing conditions of life.

The efforts of professional schools are often frustrated in the first of these efforts by the unavailability of suitable general courses in the liberal arts colleges. If the departments having responsibility for general education in the traditional liberal arts disciplines will now provide the non-specialized type of instruction needed by professional students, significant advances can be made in the years immediately ahead in extending the scope of professional education.

Never in the history of Western European culture has it been more urgently necessary for those who have primary responsibility for educating youth for a calling and for those whose primary obligation it is to provide education for the more inclusive activities of life, to work together in designing a more adequate higher education for the men and women who in the years ahead are going to determine our destiny as a people. This is clearly a time for the members of the profession of education to submerge personal, subject matter, and institutional interests in the fateful effort to provide more generous, more vital, and, in the best sense of the term, more useful higher education. Only as students in professional schools, and in liberal arts colleges, see the relationships between their work and the prosperity and welfare of our culture, and only as they have mastered the knowledge and the intellectual skills to deal effectively and courageously with the urgent problems of our day, can American higher education be said to have fulfilled its ordained mission. This is the challenge which now faces those charged with education for the professions in the United States.

Ethics in the College Curriculum

EDWARD JARVIS, S.J.

I would like to make some remarks about ethics which are prompted by Fr. Leary's rejoinder to Fr. Sponga's article, "The Place of Philosophy in the College Curriculum."¹ In this thought provoking article, Fr. Sponga discusses 1) the aim of philosophy in the college curriculum, 2) main obstacles to attaining this aim, and 3) practical suggestions for improvement. Among the practical suggestions, he touches on problems which deal with the presentation of ethics. While he advocates general ethics, he is "more and more inclined to feel that special ethics ought to disappear as such from the college curriculum." His conclusion about special ethics stems from the more general problem of the relationship between philosophy and theology in the college curriculum. He feels that this problem finds its most acute expression in special ethics. He also presents the problem of special ethics in the context of the set of values which the student brings to the study of philosophy. He feels that philosophy, as a subject which investigates ultimate values, must proceed with an awareness of the particular values which the student brings to his study.

In a rejoinder to this article,² Fr. Leary argues to the need for a course in social ethics, and highlights pertinent social problems which face college students today. While I feel that Fr. Leary has presented a good case for the need of questions in Social Ethics, I also feel that his rejoinder fails to come to grips with the questions raised by Fr. Sponga about the place of special ethics in the college curriculum, and its relationship to the needs of the student.

Fr. Sponga seems concerned, and I am too, with a de facto situation in which special ethics seems to function in a kind of void in the college curriculum. It tends to move in isolation from the faith of the student, from his psychological needs, and, perhaps too, from the rest of philosophy. If we grant these problems, the solution need not be to omit questions in special and social ethics from the college curriculum. A possible solution would be to relocate them so that they are coordinated in the total picture.

¹ Sponga, Edward J., "The Place of Philosophy in the Jesuit College," *Jesuit Educational Quarterly*, Vol. XXII, No. 1, June 1959, pp. 17-26.

² Leary, John P., "Social Ethics in Our Colleges: A Rejoinder," *Jesuit Educational Quarterly*, Vol. XXII, No. 2, October 1959, pp. 69-73.

The problem of the isolation of special ethics from the faith of the student is not, as I see it, an abstract problem concerning the validity of ethics as a branch of philosophy distinct from theology. The problem is a concrete one involving the proper maturing of the student's attitude toward moral problems. To have a mature attitude toward moral questions, both the faith and reason of the student must move along together, and be brought to bear in coordination. Reason must enter both as a human value in its own right and as a preparation for and a defense of the faith. Faith must also enter, otherwise sufficient motivation and decisiveness are lacking in difficult moral matters. It is precisely the element of coordination that is missing, not from the point of view of the sciences themselves, nor necessarily in the mind of the teacher, but in the attitude of the student which is formed by the inbuilt orientation of the courses which he takes. An overdeveloped reasoned approach to moral matters with an underdeveloped faith approach to the same questions can result in a rationalism on the part of the student, and leave him without the strength and balance to maturely face the moral problems of his life.

The lack of balance comes from various factors: from the lack of coordination between the sequence of philosophy and theology courses, from the disproportionate number of credit hours given to ethics as compared to that which corresponds to it in the theology curriculum, from the highly deductive method of approach to special ethics from the natural law. I believe that these factors combine to produce in the student an inadequate approach to moral matters.

Perhaps a more pressing problem is the relationship of special ethics to the psychological needs of the student. The courses in special ethics today are heavily dominated by law. While the presence of law must be felt in the human moral situation, law of itself is not adequate to meet the demands of the human spirit faced with moral problems. The "interior law of charity" must precede and complement the natural law, otherwise there is little hope that the commands of the natural law will be firmly assented to and observed. I am not referring now to the help which faith and theology can bring, but to an ideal of natural moral virtue. The soul of the student needs an ideal and an inspiration for the best in human values if he is to readily understand and observe that which is basically good in human values.

Moreover, law of itself is incapable of making the student human in the fullest sense of the word. It cannot fully humanize and liberalize him. He is liberally educated in the measure that values are so presented to him that they draw him out of himself and free him from his limita-

tions. This calls for an ideal of high natural virtue which will include, yet transcend, the natural law. It is only by aspiring to such an ideal that the natural resources of the student's personality can be adequately challenged and, at the same time, be predisposed in favor of the law.

Finally, the student's course in ethics should be presented with an awareness of the set of values which the student brings to the study of ethics. I am not referring to the isolated problem of this or that individual student, but to the cultural context which forms his values and gives rise to moral problems. Today in this country that context is materialism. Our society moves across a terrain whose fundamental feature is the barren metaphysical assumption that matter constitutes reality. Thus, the ideal of happiness is cast in the form of material security and comfort. Materialism is a sort of self enclosing thing. Psychologically, matter is not of itself open to knowledge. Morally, it is not of itself capable of opening the soul to the values which will set it free. Rather, it encloses one in upon himself with the illusory ideal of happiness through material gain. "What's in it for me?" That this morally corrosive ideal is fully operative in our culture is marked by the fierce competition to achieve it. More often than not, the student is too much a child of his age to question the ideal, or see its moral implications.

What is needed to break this image from the point of view of ethics is an ideal of human happiness to be achieved through the exercise of natural virtue, an ideal which will assert that high moral values are more real and more lasting and more adequate for a human being than material values. Law of itself, or the principle of double effect, or whatever establishes the lawful, commanded or prohibited, is not adequate to meet the challenge of the material ideal, first, because it is not itself an ideal although it is conformed to an ideal, and secondly, because its opposition to the material ideal is by way of implication. What directly challenges the material ideal of life, and strikes at its heart, is an ideal of human life through virtue. This ideal, when expressly stated, shows up the poor fabric of the material ideal, brings out its hidden moral implications to the student, and shows the true meaning of material things which is to embody some higher value and thus to bring men to fulfillment.

To finish with some practical suggestions, I would favor a course in ethics which gives primary consideration to the natural virtues and secondary consideration to law. I think that the primacy given to the natural virtues would meet more realistically the needs of students, as I indicated above. Moreover, I think that it would tie in better with theology as it is presented in college. It would balance without over-

lapping the treatise on the supernatural virtues. Also, being inductive in method, it would not offer the same temptation to rationalism which I described above.

At the same time, I feel that questions in special ethics are needed in the fields where special problems arise. Here at the University of Scranton, we have been thinking about carrying questions in special ethics into the curriculum of other departments. This would mean that we would offer special questions in medical ethics to premedical students, questions in business ethics to business majors, questions in social ethics to sociology majors, etc. The questions would be presented by members of the philosophy department, but in the course and classroom of the particular department where the special problems arise. If the plan succeeds, it might be a practical step toward fulfilling the unifying role of philosophy which Fr. Sponga described in his article.

It is an ambitious project with many practical details to be worked out. Perhaps it could serve as a pilot study for anyone who is interested in it.

WHY SO FEW WRITERS?

“. . . Take but one example in an area in which college administrators might well re-examine their goals and means. It seems that more and more Catholic colleges, especially the men's colleges, have ceased to publish literary magazines. It would certainly seem a shortsighted policy to deprive the students who show creative promise of this obvious channel of developing, within the college, the tradition of high regard for creativity.

“In other artistic fields than that of writing, students in many Catholic colleges are given ever increasing opportunities to develop their talents—and, even more important—their esteem for the artistic experience. Studios of painting and sculpture are many and vigorous, especially in colleges for women, but opportunities to write more than the inevitable term paper do not seem to be provided as generously or as understandingly.

“Failure to provide channels of expression in colleges seems to be a fine way to continue training legions of mute, inglorious Miltons.” Fr. Harold C. Gardiner, S.J., *America*, July 11, 1959, p. 509.

Creative Learning

EDWARD J. LAVIN, S.J.

Creativity is fast arriving at the dubious status of a fad. There are creativity teams, and creative kits, and even creative luncheons. Nevertheless, creativity is no joke. In their own silent way the intricate space-trails of the Sputniks and Luniks are constantly reminding us of this. This paper is an attempt to show the close connection of the problem of creativity with the very old problem of understanding. For the educator these analogous problems present themselves as an investigation of the best means of setting up a learning situation where understanding and creativity can take place. The complexities of these problems about the learning process are enormous since their solution presupposes some answers to the spiny problems of communication and knowledge. Obviously there are no simple solutions to these kind of things and progress in their understanding will have to be an amalgam of many insights drawn from many different kinds of experiences. It is my hope that this article can contribute something to this gradual progress of understanding.

From my reading of the lives and letters of the great artists, from discussion with present day artists, and from reflection on my own creative experiences, I have formulated a rough working idea of the conditions which are essential to the creative process. This list of conditions, like an anatomy chart, is only a remote proximation of the beautiful and delicate reality, but it has been a useful thing. Its first usefulness became apparent to me when I realized that it was also the chart of the conditions which were inevitably present in the good learning situations of my experience. The mild astonishment that this caused was perhaps naive since I should have realized that the situations would be the same. Nevertheless, this second realization has also proved very useful. It is this relationship between the creative act and the act of understanding that I wish to explore in this article. The investigation of the learning process through its relation to the creative process will reexamine some generally trite educational principles, and will make clear some general principles of methodology.

I

Before I begin with the analysis, I feel that it is necessary for the sake of completeness to mention some of the presuppositions of the argument.

Some of these are obvious, some not so obvious; all of them should be discussed, but not, I'm afraid, within the limits of this paper.

A. I presuppose that the question of real understanding is a real and vital problem for the teacher. Moreover that he sees that the non-creative and non-understanding situation is really an anti-creative and anti-understanding situation. It is possible to multiply horrible examples of this, but I do not think that this is necessary.

B. Understanding is an organic thing, a growth by assimilation. If the human personality is conceived of in a mechanical way, as a receptor-organizer-transmitter, then the only function of an educator is to present the machine with new and clearer facts, to improve the organizing functions (by logic for instance), and to improve the means of communication. This electronic brain sort of thing is certainly a part of education but it most certainly is not the totality. The analogue of the human personality is not the machine, but the tree and it is clear that you don't stuff a tree; rather you encourage its intrinsic growth.

C. Creativity is a fundamental drive of all men. Each human person is responsible for the creation of the final image of his soul. His material, the developing personality, is most subtle and powerful, and most capable of beautiful expression. This impulse for self-fulfillment gives stimulus in every area of a man's life. In this process of self-fulfillment, the teacher is the supreme artist, for his function, though indirect, is crucial. He provides the direction and at times the stimulus for this creative development and his touch must be as delicate and as sure as Rembrandt's.

D. There is a close relationship between the creative act and the act of understanding. This is not very surprising since they are both acts of the mind. But besides this generic similarity, it may be possible to show an even closer connection between them by making a simple distinction between newness and originality. The artist produces something new. This is a newness that has a social dimension, since the artist's product is new not only to himself but also to the rest of man. This added circumstance, the social dimension, adds the idea of originality to the idea of newness. This is what St. Thomas and Raphael did. They gave to the world an entirely new vision, something that no one had ever seen before. Perhaps it is because of this social dimension that these people feel such a violent need to communicate.

On the other hand, the act of understanding also produces something new to the human person. The revelation that comes to a boy when he sees the coherence of a geometry theorem is certainly not very original but it is certainly new to him. It is the newness of growth, of under-

standing. Thus newness is common to understanding and to creativity and because of this community it may be possible to say that creativity is merely understanding with an added dimension. They are essentially the same act.

Fortunately the proof of the relationship between these two acts does not rest entirely on this slim theoretical base. A much more convincing evidence of their relationship comes from the clear similarity of the psychological state that accompanies each of them. Thus the urgency and especially the personal involvement which accompany the creative act are also abundantly clear in a student at the time of real insight. At this moment, Beethoven and the student of geometry are brothers, or at least cousins. The intensity of this moment of enlightenment is one of the real rewards of teaching. I must emphasize this idea of personal involvement, since it is basic to all that I have to say. It will appear again and again in the pages that follow.

The connection between the creative act and the act of understanding is most fundamental because my method will be a series of jumps from the necessities of the creative process to the analogous necessities of the learning situation. And so the analysis itself will be the best proof of the relationship since these necessities are perfectly obvious in both cases and the similarity of the methodologies of both processes will be a most evident proof of their relationship.

II

It will soon be clear that much of what I am to say is not new. The newness of my presentation will be in the fact that I wish to unify all these elements into a single integrated approach. It is important to realize that I am not talking about individual points of method, but about a spirit of approach. The monolithic character of the presentation will sometimes make it appear to be a bit lyrical in the face of practical and institutional exigencies. This is most evident to me and I will try to correct this fault in my conclusions. Since what I am trying to describe is a spirit rather than any particular activity, it is difficult to categorize, but for practical reasons I have divided what I must say into three parts. The first deals with the process of learning itself and this includes four parts: 1) some preconditions, 2) the problem, 3) the solution, and 4) the critique. The second section deals with the atmosphere which is necessary for this process to develop. They are: 1) freedom, 2) integrity, 3) seriousness, and 4) quality. The final section will present some conclusions.

III

The Process of Learning

The pivotal insight of the whole discussion is that every creative act is the solution to a problem. Whether or not this statement could be shown to be theoretically true of the act of understanding also is not too important. It is sufficient to say that most frequently the act of understanding takes place in the matrix of a problem. In the diagram below I am attempting to present what I conceive to be the process. It should be noted that I am not trying to present an essential definition but only a spatial temporal description of external circumstances.

Preconditions

- a. search
 - b. sensibility
 - c. technique
 - d. information
- (The acquisition of the elements of knowledge)

The Problem

(The alignment of the elements)

The Solution

(The resolution of the elements)
The Creation
The Understanding

The Critique

(Reexamination and reevaluation)

In the sections that follow I will try to describe each of these stages and try to point out their application to class room procedure and methodology.

A. Some Preconditions

The mind of a creative person is an incredibly vital thing. In its restless activity it is like a bird; it is constantly probing and searching; it quivers with excitement and expectation; it is far-ranging and yet sensitive. Indeed, so overwhelming is this desire for knowledge and fulfillment that it sometimes becomes an insupportable burden. The tragic life of Vincent Van Gogh is eloquent testimony of this.

The presence of this vitality of the human spirit is obvious enough when it is present, but precisely because it is a spirit it is a difficult thing to classify. Greatly oversimplified, it seems to include at least four things; 1) The most basic thing is the desire to know, the spirit of *search*. There are two modalities of this search; 2) *sensitivity*, the way in which this knowledge is received, a lack of grossness in man's experiential functions; 3) *technical equipment*, or the way in which the knowledge is used. This would include logic, mathematical or scientific or communi-

cation techniques, in fact, whatever techniques the man will need in his field; 4) finally, a certain minimum number of necessary facts and bits of *information*.

That these qualities are present in the very great artists is quite clear. Technique is very obvious, but search and sensibility are equally obvious, and perhaps much more important.

The technique of the masters is beautifully apparent. Some of them have been so sensitive that ugliness and falsity have been almost a physical pain. The whole life of people like Michaelangelo and El Greco and Picasso can be focussed down to the single point of search.

A simple reflection makes it plain that these qualities are also present in the man of understanding. Not less evident is the fact that they are not the prerogatives of the great, but are present, or at least possible in all of us. These simple observations make it profitable to examine the learning situation for these signs of vitality. Clearly we will not find the intense activity of the great minds but an analogous, less intense and broader vitality could be expected.

It is unfortunately true that much education contents itself with the two most inert phases of these preconditions, that is, technique and information. These two elements are necessary, perhaps the most necessary in the practical order, but a total or near total emphasis on them will surely misdirect or block the other two elements, the search and sensibility. Thus we have the common phenomenon of the boy who has a really consuming interest in electric trains, or rock and roll, or stamps. He is searching but he has been blocked or misdirected. The lack of sensibility manifests itself in many ways. A common example of it is the liturgist's problem of the presentation of symbols. Because the emphasis in education is on the discursive reason (even in the teaching of poetry), the students have great difficulty in experiencing the full meaning of the delicate symbolism of the sacraments or of poetry. This important part of their development is now filled by the sledge-hammer symbols of advertising, TV, and the movies. The business men are today's poets.

It seems evident that no one will argue against vitality and awareness, but since it is difficult to achieve these things, it might be profitable to discuss their necessity. Besides the general principle which was already given, that a lack of this spirit is a positive impeding force for its development, there are other important considerations. The data of experience must somehow come to the learner. This can happen in two ways. The matter, the cognitive bits, can be presented to the student. When this is done, these normally charged things become more or less inert. They don't move or combine or grow; they become stagnant. But if these data

come to the student as a result of his own search, then the dimension of personal involvement is added to them and they are charged with their own vitality and with the vitality of involvement. In a word, what a student discovers himself is more meaningful to him. This is indeed a trite principle but a radical one. For unless the data of experience are meaningful to the student he will not be able to achieve true understanding. Can the data be meaningful except through personal discovery? A simple question like this can overturn many ivory towers of methodology.

Again, if the spirit of inquiry is never developed, education can have very little influence in the total life of the student. Indeed it must cease with the end of his formal training. This is in fact what most frequently happens. And so teaching becomes not a training of the developing human spirit but an expensive kind of lion taming. The inert spirit can learn facts but it does not develop.

I fully realize that the difficulty in this matter is that these kinds of things can not be taught in the strict sense. Rather they must be fostered in a very explicit way. This makes the difficulty a *regressus ad infinitum*, because the teacher is the key. If the teacher lacks the spirit it can hardly be communicated to the class, and frequently the reason the teacher doesn't have the spirit is that he has never been exposed to it, and so on. It is the most vicious of circles.

There are simple exercises which can be of some help. One example is an exercise that is used in an Art course but which could also be used with great profit for English and science. For twenty minutes the student studies a very simple thing, like a leaf, or a twig, or a piece of bread. Then he writes twenty things about the object, using no comparisons; then twenty things using only comparisons. Simple exercises in observation like this could be very valuable, as also are meaningful problems in research.

These kinds of things are important but they are merely manifestations of the spirit of the teacher and will be used naturally by a vital teacher. On the other hand, the inert and unaware teacher can never generate and preserve the spirit. His methodology is informed by his attitude. Indeed to the non-seeker, the seeker usually appears mad, or impertinent, or at least unintelligible. The real solution to this problem is most difficult. The only certainty that I have is that the problem must be exposed very clearly and explicitly and that we must never presume that either the spirit or the realization of its importance will take place naturally. Each teacher will have to try to foster vitality and awareness in his own way but it must be a very explicit effort.

This section has dealt with some of the preconditions of knowledge: search, sensibility, technique, and information. It is by means of these that the data of experience are acquired, more or less personally. If these data, which are all the intentional elements necessary for the act of understanding, are acquired in the proper way, then they become charged; they have hooks; they want to grow and combine. They must be aligned for this combination and the alignment of them is the next step in the creative process, the problem.

B. The Problem

When Michaelangelo created the ceiling of the Sistine Chapel, what he was really doing was solving a problem. In like manner the creations of Einstein and Mozart are essentially the solutions to problems. So also the sophomore solves a problem when he reduces the elements of the character of Brutus into some kind of an insight about this complex personality. The acts of creation and understanding are very like small atomic explosions. The elements, uranium or whatever, must be brought into proper contact with each other before they can react. In the same way, the intentional elements which are necessary for any given act of creation or understanding must be brought into meaningful contact with each other. It is the problem which brings these elements into the proper alignment and tension. It also provides the necessary charge for their inter-reaction. When this reaction occurs and they are reduced to some kind of union, we have the act of understanding or creation.

Whether this analogy be apt or not, the word *problem* is a good one to describe this stage in the creative act. It means, in general, the tension of diverse elements which must be reduced to unity.

In addition to this, it carries with it the added dimension of personal involvement, the quality which is so characteristic of creativity. It also gives us a clue to the methodology which is essential to the acts of creation and understanding. Malraux says that the central problem for the artist is to personalize the tradition, that is, he must break away somewhat from the tradition, or better, he must inject his personality into the tradition. In this way, the whole life of an artist becomes an attempt to solve a very real problem. Whether this be true or not, the artist is faced with problems on several levels. Cézanne's avowed problem was to find the way to show forth God's glory which is manifested in His creation. To do this he had to reduce the various visual elements, the trees and stones, through the distillation of his own personality and to join them with his central problem. Then he had to combine this

derived solution with the elements of his technique, the brush, canvas, and paints. The final work was the beautiful solution to these problems. The same kind of process is described very clearly by the mathematician Poincare in the book, the *Creative Process*.

Is it true to say that understanding also always occurs as a solution to a real problem? On the practical level I have chosen, it is possible to bypass this theoretical question and state simply, as a matter of common experience, that understanding most frequently takes place in the matrix of problem and involvement. In practice there are four kinds of learning situations which correspond to the four kinds of teachers, the stuffer, the pusher, the leader and the steerer.

a. The *stuffer* gives his students answers. In this method there is no real understanding unless the student has the spiritual vigor to work back from the answer to the problem. This kind of inversion is really too much to expect from the average student. There is a good deal of this kind of teaching. "In this play the character of Marc Anthony is . . ."

b. The *pusher* presents the problem to the students and then gives them the answer. This is really not much better than the first method because it never gets into the interior processes of the student. "See how Marc Anthony acts in this situation. This means that he . . ."

c. The *leader* presents the students with the problem and allows them to work it out for themselves. This is a vast improvement over the first two methods. "Why does Marc Anthony act in this way?"

d. The *steerer* is the teacher who presents his matter in such a way that the problem arises from the student himself. The problem is not then induced but rises immanently. "Would you vote for Marc Anthony if he were running for mayor?"

There may not seem to be much difference between the last two methods but the class reaction to them can be enormously different. The reason for the difference in the results and reactions to these four methods is that they represent four degrees of problems, and thus four degrees of personal involvement. And it is involvement which is the mark of real understanding because it indicates that the growth of the personality is immanent, that it is real growth. From this it is evident that the problem must be intrinsic. There can be an engagement with knowledge on an extrinsic level. Many students are really involved in the acquisition of knowledge but only for passing examinations. This kind of extrinsic problem can never lead to real understanding because understanding must be the result of inner growth.

In practice this question can be asked. Is the better teacher the man

with real problems or the man with answers? Of course this is a false dichotomy since the teacher must be both, just as he must employ all four of the methods I mentioned above. Nevertheless the question is useful for examining the controlling attitude of the teacher. Which method does he prefer to use? How often does he try to bring out a real problem?

If it is true that the problem is more or less necessary for real understanding, then the question of methodology arises. It does not seem that the change in methodology would be too difficult for an experienced teacher if he thought of this in an explicit manner as a desirable or even necessary thing. The whole of the *Rime of the Ancient Mariner* could be handled around the central problem of punishment. The student of physics could be asked not only to do the experiment but to work out for himself what the experiment must be like. While it is not too difficult, this method does require a certain amount of imagination and intensity and so can be easily forgotten. On the level of the personality of the teacher the problem is much more difficult and complex. You can not do too much with the man who has all the answers.

C. The Solution

If the data have been gathered in a meaningful way and have been properly aligned in the dynamism of the problem, the solution will follow. This solution is the creative act or the act of understanding. It is true that this does not always happen since these things operate in their own mysterious way. One of Poincare's solutions came to him as he was stepping on a bus and Mozart composed a whole symphony as he was riding in a carriage. We know from our own experience that understandings come in utterly unexpected times and manners. But if we are teaching some that do have coherence and meaning and if we have set up the proper conditions for understanding, in most instances understanding will take place. To be practical we should admit that if the answer does not come, it will have to be given. But this is an expedient and should not be the normal situation.

D. The Critique

A human person is naturally in love with his own solutions, and like most people in love is not very objective. Thus the student must be trained to examine his understandings. The critical faculty is as necessary as the spirit of inquiry and like any habit it must be trained. Does his solution really answer the problem; is it true to the data; is it logical; is

it true to experience; how does it relate to other truths? These and similar questions must always be asked.

The critical faculty extends and must be trained in two directions. We must examine our own solutions and those of others. The first of these is rarely developed, first, because there are so few personal understandings, and second, because we tend to take this critique for granted, whereas it must be done explicitly. There is normally a fair amount of the second kind of criticism but it is usually an extrinsic kind of thing and then it becomes carping. Trying to examine another man's insights without entering his problem is as futile and much less honorable than tilting with windmills.

Besides the obvious motive of integrity there is another reason for the development of the critical faculty. The inspection and examination of solutions leads inevitably to further problems and thus the process starts all over again. This is why each understanding is like a seed and why the truly learned man never stops learning.

IV

Conditions of Understanding

The previous section was an attempt to describe the normal process of the act of creation and the act of understanding. It is now necessary to mention briefly some of the qualities which are usually present in this process. These qualities are the atmosphere of learning. They are the light and air of intellectual growth.

A. Freedom

Beethoven wrote the following words on the top of his manuscript of *The Great Fugue*, "The Great Fugue, sometimes free, sometimes careful." This is the way it is with all great art. Creativity is always a tension, a balance of freedom and restriction. The artist is restricted by his technique, his materials and the tradition. He is free to the degree that he produces newness, originality. These two forces, restriction and freedom, must stretch against each other until the tension of beauty is reached. In different ages the proportion of each is different. In Byzantine art, the restrictive predominates; today freedom is much more noticeable, but each is beautiful in its own way. The proportion depends upon many things, the state of the tradition, the spirit of the times, the techniques available, etc., but whatever the proportions, both elements must be present.

The freedom of understanding is analogous to the freedom of creation. Creativity must be free to the degree that it is original because originality means a break and an advance in the tradition. The artist is free not only in what he creates but in the way that he creates it. The act of understanding is not free to this degree, since there are limits to the meaning of the thing understood, as the meaning of a poem or the construction of a theorem. The freedom of understanding must be present in the process, in the acquisition of the data and in the structure of the problem. In other words, wherever possible the student should be able to seek his own data, to ask his own questions, and at times to hold his own solutions.

It is fairly obvious that a certain amount of freedom in the learning process is desirable. The reason for this is also quite clear. It is again the necessity for personal involvement. Given the ethos of the American student, the fact that in some ways he is more independent at an earlier age than any other child in civilized history, complete restriction in any area will be deadly. It is trite but true that we are a free people.

There is indeed a paradox in this whole matter. We are surely a free people but we are not less surely a people who are addicted to conformity. The result of this is that an individual will rebel if his freedom is restricted from the outside and yet if he is left to himself he will restrict his own freedom to a remarkable degree. There are multiple examples of this kind of behaviour in any class room, or living room or bar room. This means that freedom in education is a delicate thing; there is a silent, even unconscious revolt when the areas of knowledge are completely restrictive and yet when a certain amount of freedom is allowed to the learner, he may have to be pushed into using it for it requires great courage. However delicate, a certain amount of freedom is necessary and especially for Catholics since we do have a little bit of our much discussed tendency to be sheeplike.

Obviously I am not talking about discipline or an unreal type of permissiveness. I am talking about freedom within set areas of curricula and methodology. This is not as dangerous as it sounds. If the subject has its own truth and coherence, and the wise teacher is able to steer the process in the proper direction, the student should come to the point of understanding that the teacher thinks important. Indeed it may be true to say that if the student can not come to this point himself, the point is not really important. Even though there are an infinite number of questions which can be asked about *Lady Macbeth*, there are only a certain number that can and should be asked by a seventeen year old boy. It is much more important that the student have answers which are

meaningful to him and a basis for future development than that he have an answer which is a kind of meaningless intellectual subway token.

The balance of freedom and restriction may be somewhat difficult to control because it will be an exercise in human relationships. But no matter how difficult or delicate, it must never be abandoned. Our emphasis should always be on the greatest, not the least profitable degree of freedom.

V

The next three qualities are important but very obvious and it is not necessary to say much about them. They are important because they act as a guidance system for this whole method. They prevent the process from becoming precious and overly clever.

B. Integrity

Georges Rouault once destroyed hundreds of his paintings because he thought that they did not measure up to his vision. This kind of vigor and ruthlessness is just as necessary in education. It means complete honesty in the face of one's work and understanding. The application of this spirit to the learning situation is manifold and it is not necessary to develop it. Obviously no one is against intellectual honesty but it is sometimes avoided on the grounds of practicality. This can be the cancer of intellectual development.

C. Seriousness

Art and understanding can be exhilarating but they are not a game. The creative man is deadly earnest about his work. This spirit must also be in the learner. He must realize that he is engaged in a serious business. Not that learning is somber; it can be fun at times but it is a job, serious work in a very real sense.

D. Quality

To inject a note of toughness and stiffness into a thing that might become too lyrical, it is necessary to insist on quality work. This is part of the balance of freedom and a function of integrity. The student who has a really silly and meaningless answer must be told so. The difficulties in this area, the different degrees of quality and the problem of testing real understanding, have been much discussed and there is no need to go into them here.

VI

Conclusion and Practice

Even at the very uncomfortable risk of being tedious, it was necessary to list and briefly explain these more or less obvious things about the learning situation. First, because it happens frequently enough that these qualities are omitted in practice, even though they are commonly recognized as valuable. Second, it was necessary to show the very close similarities between the creative situation and the learning situation. Third, there was a real need to make very clear what was meant by this process and its qualities since I wish to do something a little unusual with them.

The central purpose of this whole article is to try to demonstrate a practical method which will duplicate in the learning situation the electric quality and the intensity of the creative situation. I do this because my experience in learning and teaching has convinced me that the greatest advances in learning take place when these conditions are present.

The method is really quite simple. In its extreme form it consists in the explicit and *exclusive* use of the process and qualities I outlined. Imagine, if you can, a teacher who never presented anything which was not a real problem to him. This would result in a learning situation where the relationship between the teacher and the student would be a partnership in discovery, where each would help the other to advance. This would be the method of creative dialogue, an existential problem method.

Luckily this little Platonic dream admits of stages and degrees. One step below this somewhat fanciful situation is the one where the teacher prepares his course in such a way that it revolves around things which are or can be made into real problems for the students. A fair amount of freedom would have to be permitted to the student at this stage. One more step below this is the situation of the teacher who is aware of the method and consistently tries to use it as often as he can. This stage is the one which is the most practical and the one which I am trying to present. For once you get below this level you come down by varying degrees to more and more inert levels until you come to the dead bottom, the memory of information.

To speak very plainly, I must confess that I think that too much of our teaching is of the more or less inert quality. The reason for this is that we never make *explicit* to ourselves the creative possibilities of the process I

have presented. Too often we allow nature to take its course in these things and it is much too important for this. The statement that personality is 75% of teaching is this kind of facile evasion. The result of all of this is that the process is frequently not present at all and teaching becomes too tight. Sometimes our students are like those beautiful little Japanese trees, perfect in every detail, but only the tiniest fraction of the size of the true tree. Sometimes even, these little trees become distorted. The learning situation must be loosened up a bit to allow for growth.

To be practical some things must be said. First, I fully realize that there are many difficulties in this, especially in the areas of time and freedom. Self-development like any growth takes time. And so it seems inevitable that there will be conflicts between freedom and the text book and the syllabus. These latter are certainly very essential but truth usually lies somewhere in the middle of extremes. The syllabus and the text book can be just as dangerous as too much freedom. Second, some courses are obviously more open to this kind of thing than others. A course in English or creative writing or art appreciation is clearly a wonderful opportunity for this. A more restrictive course, like grammar, is less open but even here there will be opportunities. Third, this method might be dangerous in the hands of a young teacher who is still trying to find his classroom personality and his discipline and presentational techniques. Yet this young teacher will be more inclined to use it, while the older, more experienced, teacher who could handle the method most effectively would be less likely to use it. Fourth, it will be very necessary to find the degree of freedom proper to each stage of the student's development. Naturally the graduate student has to be freer than the high school freshman. Yet psychologists say that the most dangerous age for the loss of the spirit of creativity is between the ages of 10 and 13. Therefore in some measure or other this method must be used at all levels of education. Creativity and understanding are a matter of steady growth.

Granting these practical and institutional necessities, we can still make a general principle. The method of the free real problem should be explicitly used as often and to as great an extent as possible. The method will be limited as necessary by the exigencies of the text book, syllabus, student ability and teacher ability. This principle puts the emphasis of attitude in the proper place.

Of course information must be given and memorized. But from this stage each teacher will be able, and sometimes even obliged to rise up through the various stages I mentioned, even, at select times, to the high stage of creative dialogue. There would have to be small beginnings and careful experiments. For instance, it might be a very valuable experiment

to take a second year english class and try this method for about two weeks. You could start with a problem which is especially acute at that time, like discipline, or punishment, or responsibility, or self-revelation. You could then select material which would give some kind of a start to the process and add more material to exemplify the direction the discussion took. I think that the results would be startling.

In the one instance I know where this method and spirit have been used at almost full power the results have in fact been almost incredible. Sister Magdalen Mary, I.H.M. and Sister Mary Corita, I.H.M. who run the art department of Immaculate Heart College in Los Angeles, have put into operation a powerhouse of creative and intellectual activity. The outcome has been so amazing that in just a few years their influence is beginning to be felt in many places. It is true that an art course lends itself beautifully to this method, but that fact was not so obvious when they started because art courses can be as deadly and inert as any others. It required great courage on their part to make the break but the results have shown that their instincts in this matter were true. The most interesting thing about their experiment is not that they turn out artists (which they do) but that their students become intellectually alive in all areas. They turn out people who are searching.

If most of what I have said is theoretically obvious, it is not so obvious in practice and this is, after all, the important thing. If some were to disagree with me totally, even this would be a very good thing because my statements will then have caused a certain awareness, a reexamination of the bases of teaching, a problem, and the beginnings of a creative-learning process.

A New High School Physics Course

FREDERICK L. CANAVAN, S.J. and JOSEPH F. MULLIGAN, S.J.

During the past few years, especially under the impetus of the challenge posed by Russian scientific progress, scientists and educators have been trying to improve mathematics and science instruction in the high schools. Typical of the efforts being made are the Summer Institute Program and the Fellowship Program sponsored by the National Science Foundation for high school teachers; the National Defense Education Act grants for the purchase of high school science equipment, and the cooperation of many colleges in early morning television courses in physics and chemistry.

A more significant attack on the problem is shown in the efforts of those who are reappraising the actual contents of the high school courses. In this area revolutionary changes have been proposed and tried in mathematics and physics, and work is started on the development of a new high school chemistry course.

In this article we will restrict ourselves to a description and an evaluation of the new high school physics course, which has been worked out by the Physical Science Study Committee, which is familiarly called PSSC. This project was begun in 1956 by a group of physicists under the sponsorship of the Massachusetts Institute of Technology, and was carried forward with support from the National Science Foundation, the Ford Foundation and other sources. A remarkable amount has been accomplished in these four years, and this is a tribute to the dedication of Professor Jerrold R. Zacharias, chairman of the PSSC, and his collaborators, and to the cooperation they have received from the high school teachers of the country.

The PSSC was originally triggered by a 1956 report of a committee on High School Teaching Materials.¹ This committee found that high school physics text books failed to give an appreciation of what physics really was, but rather treated the subject as a collection of isolated facts, playing up technical applications at the expense of basic scientific

¹ W. C. Michels, *Physics Today*, 10, pp. 20-21 (January 1957). S. W. Cram, *American Journal of Physics*, 25, pp. 274-276 (1957).

concepts.² The committee found that the textbooks failed to communicate to the students the inquisitive and searching attitude which makes the successful physicist. Physics was taught as a closed system, and no indication was given that there are, and always will be, unanswered questions in particular fields of physics. The committee found that the usual high school physics laboratory was a cookbook affair with the students blindly following printed directions and filling in spaces in laboratory books with no real appreciation of what they were doing, and why they were doing it.

The PSSC Program aims at remedying this situation. To do this, the committee has prepared a course that is not aimed specifically at preparing the student for college physics, but rather has a two-fold aim: 1. To provide an appreciation for science and a good scientific background for the twenty-five percent of the high school population now taking physics. 2. To develop a physics course that emphasizes the essential, intellectual, aesthetic, and historical background of physics.

To achieve these purposes the PSSC has labored mightily. They have prepared a completely new text book, which is presently available in four paperback volumes, but which will be available in the Fall of this year in a single hard covered volume. The text included large numbers of excellent illustrations, especially made for the course, and an ample supply of problems and suggestions for home study.

A completely new set of laboratory experiments has been designed. These are performed with very simple equipment, but give a clear insight into the physical problems, are closely integrated with the text book, and are "open-ended" in the sense that they lead the student on to further investigation on his own. A set of about thirty films has been prepared in which outstanding physicists act as narrators and perform demonstrations that would be beyond the scope of most high school lecturers and equipment. A voluminous teacher's guide has been prepared which includes concise statements of the objectives of each section of the text and suggestions for approaching it, together with completely worked out solutions to all of the problems. The Educational Testing Service has prepared special final examinations as well as examinations on the separate sections of the text, and there is a special version of the College Entrance Examination Board achievement test in physics for students who have had the PSSC course. Finally a set of well over one hundred paper backed monographs on specialized topics in physics are being

² There is one well known book in which five pages are devoted to colored pictures of a power shovel, but in which the name of Bohr cannot be found!

prepared for the high school students by experts in the field. The first six volumes have already been published and have been widely applauded by reviewers. Even from a merely quantitative point of view, the amount that has been accomplished by this group which has been in existence for less than four years is very impressive.

The question remains, however, whether all this effort and all of this material have really improved the high school physics situation, and whether the PSSC Program will become the generally accepted physics course in the nation's high schools.

The answers to these questions can only come from widespread tests of the program in various types of American high schools. These tests are now being made on an expanding sample. During the school year 1957-1958 the course was tried in eight rather specialized high schools throughout the country. In 1958-59 the number of schools teaching at least one section of PSSC Physics increased to 278. In the present year 1959-60, six hundred schools are teaching the PSSC course to some of their students. Up until this time, distribution of the PSSC material has been rather tightly controlled and only teachers who had been previously familiarized with the course through special institutes, were allowed to teach it. Starting in the Fall of 1960 the text book, the laboratory material, the films and the monographs will be made available to all those who wish them and any teacher who feels so inclined may teach the PSSC course to his students.

It may well be too early to judge the success of the PSSC Program, but the feed-back from the schools is quite encouraging. The response of the students has been enthusiastic. The good student has been challenged and stimulated by the new course, whereas experience shows many good students have frequently been bored by the conventional high school course. The poor student finds the new course difficult since the emphasis is on thinking rather than on memorization of facts and formulae, but frequently he becomes quite interested and perhaps gets more from the PSSC course than he would from the standard course. The students are uniformly enthusiastic about the laboratory, which succeeds in illustrating important concepts and measuring important physical quantities with inexpensive but ingeniously contrived equipment. From the course the student gets an appreciation of the unity and beauty of physics and some feeling for the groping and struggle involved in scientific progress, and the realization that there still exist many unanswered questions. This is the type of approach that it is felt will go far to inspire the gifted student to choose physics as a career, and will give the student who will

not take any further course in physics an understanding of what physics is and what the physicist is trying to do.

The chief difficulties that have arisen in regard to the PSSC Program could probably have been foreseen even without the trial teaching in the high schools. The course is rather difficult, especially for students who have not been used to working and thinking. The examinations that have been prepared by the Educational Testing Service tend to be rather difficult and even the best students get relatively low marks which are then converted to percentiles by statistical analysis of the results from the whole population tested. The result of this is that both teachers and students who are used to getting high marks are discouraged by the apparent low marks they achieve in this type of examination. Because of the widespread nature of the complaints received on this score, the examinations are being modified so that the grades will be more in accord with the students experience in other courses. Another important difficulty is that many high school teachers are inadequately prepared to undertake the teaching of this course which places much stress on fundamental understanding and a knowledge of recent developments in physics. The PSSC course suggests questions to the bright student that are sometimes not easy for even the well trained and experienced teacher to answer. To improve this situation, summer institutes and in-service institutes treating the PSSC course content have been set up in a dozen universities and colleges. In these institutes, college physicists with the help of high school teachers with some experience teaching the PSSC Program, share their knowledge and know-how with teachers who are planning to introduce the new course in their own schools.

An institute on the PSSC course was held at Fordham under the sponsorship of the National Science Foundation during the summer of 1959, and a similar institute will be held during the summer of 1960. Such institutes are obviously not the complete solution to the problem, but they do help the inexperienced teacher to approach the PSSC course with more confidence, and steps are being taken to include an introduction to the PSSC course into the curriculum of the Teacher's Colleges.

The Committee is well aware of the difficulties with the PSSC Program, but as the participating schools feed back the results of their own experiments it is hoped that some of these difficulties will be eliminated. Even today, while the program is still in a preliminary and experimental stage, it seems to be significantly superior to the old-fashioned high school physics course. A professional physicist reading the new text feels that here indeed is the real physics that he knows and at which he works.

The college physics teacher feels that a student trained to think and understand physics in the PSSC course would have much less difficulty with college physics than do the majority of the students who are taking the subject today. Professional educators and the well informed parent who is alive to the crises of our times should see in the PSSC Program an attempt to convey to the student some feeling for the power of physics and the importance of the role of the physicist in an atomic age.³

The PSSC Program and Jesuits Schools

From the rapid growth of the number of schools using the program and from the enthusiasm of teachers who have been exposed to it through an institute or through their own reading, it seems clear that the PSSC Program will gradually become the accepted physics course in most of the better secondary schools in the United States. The intrinsic merits of the course and the absence of any real competing course, as well as the support of many of the foremost physicists of the country and of the leading foundations, are factors which will lead to a swift increase in the number of schools teaching the program. Already the Marianist Brothers and the Brothers of the Christian Schools are introducing the new program into their high schools.

This raises the important question as to what should be the position of our Jesuit High Schools with respect to the PSSC Program.

As far as we know, the only Jesuit school in the country teaching the PSSC course at the present time is Boston College High School, where Father James McCaffery, S.J. is now teaching PSSC Physics for the second time. He himself is quite enthusiastic about the course and the favorable reaction of the students is manifest from their greatly increased interest in physics. A number of teachers from other Jesuit High Schools have participated in PSSC summer institutes, but for one reason or another are not teaching the course as yet. On the basis of the experience gained in conducting the summer institute in PSSC physics last year, the authors feel that this program fits very well into the framework of the ideal Jesuit high school curriculum. A prime consideration is the fact that in general the boys in our schools are superior to those in both other

³ For further information on the PSSC course see: H. P. Knaosse, *American Journal of Physics*, 26, pp. 378-380 (1958). E. P. Little, F. L. Friedman, Jerrold Zacharias, and G. C. Finlay, *The Science Teacher*, 24, pp. 316-327 (November 1957). *First Annual Report of the Physical Science Study Committee*, The Committee, 164 Main Street, Watertown 72, Massachusetts. Symposium on PSSC, *Harvard Educational Review*, 29, pp. 1-36 (1959). G. C. Finlay and F. L. Ferris, *The Science Teacher*, 25, 8 (December 1959).

Catholic schools and in public schools, and, as superior boys, they have the right to a physics course that is not only real physics but also challenging and demanding. The objection that the PSSC course is too difficult for the student, applies less to our schools than to other schools. As time goes on, the Jesuits and laymen who teach the physics course in our schools are acquiring more experience and formal training. These teachers are becoming more and more equipped to get the most out of the PSSC course, and they should be stimulated and challenged by the demands it makes on their teaching skill. Our experience at Fordham in reviewing the applications for the summer institute, submitted by teachers in all types of schools, leads us to conclude that to an increasing extent the religious physics teachers in Catholic schools are better prepared than their counterparts in the public school system. This is due to the fact that these teachers continue taking summer courses, while their counterparts in the public schools are forced to take summer employment to meet their financial obligations. If this is true, Catholic schools in general and Jesuit schools in particular should be in a favorable position for using this course, since the course stands or falls with the teacher who uses it.

The second advantage of the PSSC Program for our high schools is more fundamental and important. We pride ourselves on the liberal nature of our education, and the PSSC Program is a course that is much more appropriate to a liberal arts curriculum than the standard physics course. The liberal, humanistic approach to physics should stress fundamental concepts, should try to convey some idea of the methodology of science and how the physicist works to the student, and should develop in the student the ability to think and to apply previously learned theories and laws to novel situations. This is precisely what the PSSC Program is trying to do. There is no stress on the enumeration of large numbers of unrelated facts, or on solving problems by the mechanical substitution of numbers into memorized formulae. No time is wasted in understanding how refrigerators, air conditioners and steamshovels work, without attention to the basic physics involved. The result of this is that the student at the end of the PSSC physics course should not only know more real physics but should be a better educated man, because he can then apply his knowledge to new situations, appreciating the historical background of the materials with which he works. It is interesting that, as was pointed out in a recent editorial in *Science*, "In the present efforts of redesigning science and mathematics programs, the more the course is revised to meet the Soviet scientific and technological challenge,

the more it becomes a course appropriate to the liberal arts education.”⁴

One criticism of the PSSC course that is frequently heard is that it has dropped a number of important topics from the physics syllabus. Geometric Optics and Electrical Circuits are among the things singled out. The usual reply of the PSSC to this objection is that these topics are simple enough to be treated in the General Science course which is given in most public schools.

Jesuit schools may seem to be at a disadvantage here, since there are few of our schools teaching a General Science course. It should be noted, however, that in the Jesuit high schools of the New York Province a course in the fundamentals of science is being introduced in sophomore year, for the students in the Honors Science sequence. This is to be followed by chemistry in junior year, and physics in senior year. At the moment, discussions are under way toward the development of suitable advanced chemistry and physics courses to follow the sophomore course in the fundamentals. It would seem to us that the PSSC course fits in beautifully as the physics course in such a sequence. Many of the simpler topics omitted in the PSSC course could be treated in the sophomore course in fundamentals. The chemistry course with its emphasis on atomic and molecular structure would prepare the way for the PSSC Program in which atomic structure is one of the two basic organizing concepts, the other one being wave motion. This combination would give a good three year sequence, culminating in a real challenging course, instead of the present somewhat unintegrated high school science program.

For all the reasons given above, the PSSC Program would seem ideally suited to our Jesuit high schools. While it is still not the complete solution to the problem of the high school physics course, it seems a big step in the right direction and further progress can be expected as professional physicists collaborate with experienced high school teachers to revise and improve the course. Initially the change over the PSSC will require a small financial outlay for new laboratory equipment. This equipment, however, is much less expensive than that used in the conventional course and many items of equipment already on hand can be put to good use. Objections have been raised to the introduction of this course because of the high cost of the films which are an integral part of it. This objection has a twofold answer in that the films are available for rent, at about five dollars per booking, and that experience has shown

⁴ Joseph Turner, *Science*, 130, p. 1628 (December 1959).

that the average teacher will use fewer than five of the films in the course of each semester's work.

In summary then it would seem that there are academically solid reasons for introducing the course into our schools and that the practical difficulties standing in the way are minimal. Consequently, we would be false to our traditions of excellence in high school education if we are to lag behind and refuse to take cognizance of the value and desirability of this new program.

CORRIGENDA

(JEQ, VOL. XXII, NO. 3, JAN., 1960)

It would seem that the Managing Editor of the JEQ has arrogated to himself powers proper only to the Reverend Father General and the Fathers Provincial in suppressing five colleges and in substituting an Engineering School for a Law School at Creighton.

Please make the following changes in the article on Enrollment Statistics:

Page 154—delete the figures of 187 from Engineering column at Creighton. The new total for Engineering is 5955 or a loss of 236.

Page 154—add 81 to total of Day Law and 106 to total of Night Law, both at Creighton. The new totals will be Day Law, 2283, or a loss of 52. The Night totals will be 2122 or a plus of 41.

Page 159—The text should read "28" colleges rather than "23." The five schools removed from this year's totals were Philosophates and Theologates.

Status of Special Studies

1959-1960

EDWARD B. ROONEY, S.J.

In my report on the Status of Special Studies for 1958-1959, I shared the good news that the 1959 total of 260 full-time special students was the highest we had reached since we began publishing these annual surveys in the March 1944 issue of *The Jesuit Educational Quarterly*. One is always reluctant to make such statements for fear that the next year one might have to report a decrease. Any such fear I may have entertained last year was dispelled by the tables furnished me recently by Father Eugene F. Mangold, which summarize the 1959-60 survey.

I. COMPARATIVE STATISTICS, 1955-1960

	55-56	56-57	57-58	58-59	59-60
Full-time Graduate Students	208	227	247	260	292
Priest Graduate Students	149	162	158	169	177
Scholastic Graduate Students	59	65	89	91	115
Candidates for Ph.D.	123	131	133	164	174
Candidates for Other Doctor	22	28	22	22	29
Candidates for M.A.	24	22	44	34	34
Candidates for M.S.	16	26	30	20	33
Candidates for Other Masters	1	1	3	9	5
Candidates for Other Degrees	6	5	4	6	6
Special Studies but No Degree	16	14	11	5	11

Table I shows that in the academic year 1959-60 we have 292 Jesuits devoting full-time to special studies, an increase of 32 over last year's total of 260. With this increase we have reached the highest total ever reported in our annual surveys, which actually go back to 1941-42. I suspect, therefore, that this is the all-time high for the American Assistancy.

The increase of 32 special students is made up of 8 priests and 24 scholastics. Of the 292 special students, 203 are studying for the doctorate (187 last year); 72 are working for a master's degree (63 last year); 6 are working for other degrees; 11 are devoting their full time to special studies without a degree objective.

The average number of special students per province this year is 29.2. As may be seen from Table IV, 5 provinces are above this average with 2 of the 5 having more than 45 special students each. It is obvious that

no conclusion can be drawn from such comparative figures without first ascertaining more about the manpower of the province concerned.

Table II enables us to see the emphasis given to the different subject fields by individual provinces. Since it also shows the total number of the students assigned to each subject, it reveals this year's priority of claim to Jesuit manpower of each field of study. This year's order of preference, together with the number of students assigned to each field is as follows: Physics 26, Philosophy 24, Scripture and Theology 24, Chemistry 25, History 23, English 22, Languages 20, Biology 19, Math 18, Classics 13, Sociology 12, Economics 11, Political Science 11, Education 11, Psychology 8, Law 8. These 16 fields of study claimed 275 of the total of 292 special students. One to three Jesuit students were assigned to each of the following 12 fields: Astronomy, Business Administration, Communication Arts, Engineering, Geophysics, Industrial Relations, Library Science, Medicine, Music, Psychiatry, Social Work, Speech.

It is interesting to see the variety of educational institutions attended by Jesuit students. Of the 292 special students 146 are studying at Catholic universities, and 114 at secular institutions. St. Louis this year leads again with 40 Jesuit students; Fordham has 37; Georgetown 21; The Gregorian 19; Catholic University of America 18; Loyola University, Chicago, 10. The largest Jesuit enrollment at secular universities is at Harvard and Johns Hopkins, each of which has 13 Jesuit students. Forty-eight Jesuits are studying in European universities and 4 in Canadian institutions.

One may not forget that this group of 292 graduate students represents an extraordinary investment in the future of Catholic education in the United States and a deep realization of its future needs. Perhaps some special student might be interested in trying to discover the return yielded to the American Assistancy on this investment of men and money over the past ten or fifteen years. Such a study, together with a fuller study by Father General Janssen's letter, *De Ministeriis*, would, I am sure, lead to some very interesting conclusions.

II. MAJOR FIELDS

<i>Subject</i>	<i>Calif.</i>	<i>Chicago</i>	<i>Detroit</i>	<i>Maryland</i>	<i>Missouri</i>	<i>N. Eng.</i>	<i>N. Orle.</i>	<i>N. York</i>	<i>Oregon</i>	<i>Wisc.</i>	<i>Total</i>
Astronomy . . . . .	.....	.....	.....	1 Ph.D.	.....	.....	.....	.....	.....	.....	1 Ph.D.
Biochemistry . . . . .	.....	1 Ph.D.	.....	.....	.....	.....	1 Ph.D.	.....	.....	.....	2 Ph.D.
Biology	1 Ph.D.	.....	2 Ph.D.	2 Ph.D.	1 Ph.D.	1 N.D.	1 Ph.D.	2 Ph.D.	.....	2 Ph.D.	13 Ph.D., 1 N.D., 5 M.S.
Business Administration . . . . .	.....	1 Ph.D.	.....	.....	.....	.....	.....	.....	.....	.....	1 Ph.D.
Chemistry	1 Ph.D.	.....	2 Ph.D.	4 Ph.D.	2 Ph.D.	2 M.S.	1 Ph.D.	1 P.D.	.....	2 Ph.D.	12 Ph.D., 9 M.S., 1 N.D.
Classics . . . . .	.....	4 Ph.D.	3 Ph.D.	1 Ph.D.	1 Ph.D.	.....	.....	1 Ph.D.	1 Ph.D.	.....	2 M.A., 11 Ph.D.
Communication Arts . . . . .	.....	.....	1 Ph.D.	.....	.....	.....	.....	.....	1 M.A.	.....	1 Ph.D., 1 M.A.
Economics	1 Ph.D.	.....	.....	1 Ph.D.	.....	1 Ph.D.	.....	2 M.A.	.....	1 M.A.	8 Ph.D., 3 M.A.
Education	2 M.Ed.	.....	.....	.....	1 Ph.D.	1 Ph.D.	.....	2 M.S.	.....	2 Ph.D.	5 M.Ed., 4 Ph.D., 2 M.S.
Engineering	2 Ph.D.	.....	.....	.....	.....	.....	.....	.....	.....	1 M.S.	2 Ph.D., 1 M.S.
English	2 Ph.D.	1 M.A.	.....	1 Ph.D.	3 Ph.D.	3 Ph.D.	.....	3 Ph.D.	.....	2 Ph.D.	14 Ph.D., 8 M.A.
Geophysics . . . . .	.....	.....	.....	1 Ph.D.	1 M.S.	.....	.....	.....	.....	.....	1 Ph.D., 1 M.S.
History	1 Ph.D.	1 Ph.D.	2 Ph.D.	.....	2 Ph.D.	1 M.A.	1 Ph.D.	3 Ph.D.	2 Ph.D.	3 Ph.D.	15 Ph.D.
Industrial Relations	1 M.A.	1 M.A.	.....	.....	3 M.A.	.....	.....	.....	.....	1 M.A.	7 M.A.
Language . . . . .	.....	.....	.....	.....	1 Ph.D.	.....	.....	.....	.....	.....	1 Ph.D.
	2 Ph.D.	1 Ph.D.	.....	.....	1 M.A.	1 D.O.L.	1 N.D.	1 Ph.D.	1 Ph.D.	2 Ph.D.	7 Ph.D., 3 M.A., 1 D.O.L., 6 N.D., 1 S.T.D.
	.....	.....	.....	.....	.....	2 M.A.	.....	.....	.....	.....	1 S.T.D.
	.....	.....	.....	.....	.....	5 N.D.	.....	.....	.....	.....	1 S.T.D.

II. MAJOR FIELDS (continued)

Subject	Calif.	Chicago	Detroit	Maryland	Missouri	N. Eng.	N. Orle.	N. York	Oregon	Wisc.	Total
Law	1 J.D.	1 J.C.D.	1 J.C.D.	1 J.U.D.	2 LL.B.	1 S.J.D.	1 Ph.D.	1 N.D.	1 LL.D.	1 J.D., 1 J.C.D., 1 S.J.D., 1 N.D., 1 J.U.D., 2 LL.B., 1 LL.D.	1 J.D., 1 J.C.D., 1 S.J.D., 1 N.D., 1 J.U.D., 2 LL.B., 1 LL.D.
Library Science	1 M.S.										1 M.S.
Linguistics				1 Ph.D.							1 Ph.D.
Mathematics	1 Ph.D.	1 Ph.D.	1 Ph.D.	1 Ph.D.	1 Ph.D.	1 M.A.	1 Ph.D.	1 Ph.D.	1 Ph.D.	2 Ph.D.	10 Ph.D., 1 M.A., 6 M.S., 1 P.D.
Medicine	1 M.D.										1 M.D.
Music	1 M.A.						1 Ph.D.				1 M.A., 1 Ph.D.
Philosophy	2 Ph.D.	2 Ph.D.	2 Ph.D.	3 Ph.D.		3 Ph.D.	1 Ph.D.	7 Ph.D.	2 Ph.D.	1 Ph.D.	23 Ph.D., 1 M.A.
Physics	3 Ph.D.	2 M.S.	1 Ph.D.	3 Ph.D.	1 M.S.	5 Ph.D.	1 Ph.D.	3 Ph.D.	1 Ph.D.		17 Ph.D., 8 M.S.
Political Science	3 Ph.D.	1 Ph.D.		1 M.A.	1 M.A.		1 Ph.D.	1 Ph.D.	1 Ph.D.	1 Ph.D.	8 Ph.D., 2 M.A., 1 P.D.
Psychiatry											1 R.
Psychology	1 Ph.D.		3 Ph.D.		1 Ph.D.		1 Ph.D.	1 M.A.		1 M.A.	6 Ph.D., 2 M.A.
Scripture	1 S.S.L.					1 S.S.L.		1 S.S.L.			3 S.S.L.
Sociology	1 Ph.D.		1 Ph.D.	1 Ph.D.	1 Ph.D.	1 Ph.D.		4 Ph.D.		1 Ph.D.	10 Ph.D., 2 M.A.
Social Work					1 Ph.D.						1 Ph.D.
Speech					1 M.A.						1 M.A.
Theology	3 S.T.D.	1 Ph.D.			1 Ph.D.	4 S.T.D.		4 S.T.D.	1 S.T.D.	2 S.T.D.	18 S.T.D., 3 Ph.D.

III. SCHOOLS

<i>School</i>	<i>California</i>	<i>Chicago</i>	<i>Detroit</i>	<i>Maryland</i>	<i>Missouri</i>	<i>New England</i>	<i>New Orleans</i>	<i>New York</i>	<i>Oregon</i>	<i>Wisconsin</i>	<i>Total</i>
Biblical Institute	1	.	.	.	.	1	.	1	.	.	3
Boston College . . . . .	.	.	.	.	.	4	.	.	.	.	4
Brandeis . . . . .	.	.	.	.	1	.	.	.	.	.	1
California	2	.	1	.	2	.	.	.	.	.	5
C.I.T.	1	.	.	.	.	.	.	.	.	.	1
Catholic University . . . . .	.	2	.	4	3	2	1	4	.	2	18
Chantilly . . . . .	.	.	.	.	.	.	.	.	.	1	1
Chicago . . . . .	.	1	2	.	.	.	.	1	.	1	5
Columbia	1	.	.	1	.	1	.	.	1	1	5
Cornell . . . . .	.	.	.	.	1	.	.	2	.	.	3
Fordham	5	.	.	1	3	7	2	18	.	1	37
Frankfurt . . . . .	.	.	.	1	.	.	.	.	.	.	1
Freiburg . . . . .	.	.	.	.	.	.	.	1	.	.	1
Georgetown	3	1	1	3	1	1	1	7	1	2	21
Gregorian . . . . .	.	5	.	3	1	4	1	1	3	1	19
Harvard	1	2	1	2	2	3	1	1	.	.	13
Holy Cross . . . . .	.	.	.	.	1	3	.	.	.	1	5
Illinois . . . . .	.	3	.	.	.	.	.	.	.	.	3
Indiana . . . . .	.	.	1	.	.	.	.	.	.	.	1
Iowa . . . . .	.	.	.	.	.	.	1	.	.	.	1
Javeriana . . . . .	.	.	.	.	.	.	1	.	.	.	1
John Carroll . . . . .	.	2	.	.	.	.	.	.	.	.	2
Johns Hopkins . . . . .	.	.	.	1	.	5	2	1	.	4	13
Kansas . . . . .	.	.	.	.	.	.	.	.	.	1	1
London	1	.	.	1	.	.	1	.	.	.	3
Louisiana . . . . .	.	.	.	.	.	.	.	.	1	.	1
Louvain . . . . .	.	.	.	.	.	.	1	3	.	.	4
Loyola, Chicago . . . . .	.	1	4	.	2	.	1	.	.	2	10
McGill University . . . . .	.	1	.	.	.	.	.	.	.	.	1
Mainz . . . . .	.	.	.	1	.	.	.	.	.	.	1
Marquette	1	.	.	.	.	.	.	1	.	.	2
Maryland . . . . .	.	.	.	.	.	1	.	.	.	.	1
M.I.T.	1	.	.	.	.	1	.	1	.	.	3
Michigan . . . . .	.	.	1	.	.	1	.	.	.	.	2
Minnesota . . . . .	.	.	.	.	1	1	.	.	.	1	3
Munich	1	.	1	.	.	.	.	1	.	.	3
New England Conservatory	1	.	.	.	.	.	.	.	.	.	1
N.Y.U. . . . .	.	.	.	1	.	.	.	1	.	.	2
North Carolina . . . . .	.	.	.	.	1	.	.	.	.	1	2
Notre Dame . . . . .	.	.	.	.	.	.	.	.	.	1	1
Oriental Institute	1	.	.	.	.	1	.	1	.	.	3
Oxford	1	2	1	.	.	.	.	.	.	.	4
Paris Academy . . . . .	.	.	.	.	.	.	.	1	.	.	1
Paris University	1	.	.	.	.	.	.	1	.	.	2
Pennsylvania . . . . .	.	.	.	5	1	.	.	.	.	.	6
Princeton . . . . .	.	.	.	.	.	.	.	.	1	.	1
Rochester . . . . .	.	.	.	.	.	1	.	.	.	.	1

III. SCHOOLS (continued)

School	California	Chicago	Detroit	Maryland	Missouri	New England	New Orleans	New York	Oregon	Wisconsin	Total
Rockhurst					1						1
St. Joseph's Residence						6					6
St. Louis	3	2	2	3	12	3	1	4		10	40
San Francisco State									1		1
Stanford	3		1								4
Southern California	1		1								2
Toronto	1					2					3
Texas			1								1
Vienna							1			1	2
Washington									3		3
Wisconsin	1							1			2
Woodstock	2								1		3
Yale								1			1

Astronomy at Marquette U. (1); *Biochemistry* at McGill U. (1), St. Louis U. (1); *Biology* at California (1), Catholic U. (1), Chicago (1), Fordham (5), Johns Hopkins (2), Michigan (1), M.I.T. (1), Munich (1), Pennsylvania (1), St. Louis (2), Stanford (1); *Business Administration* at Harvard (1); *Chemistry* at Boston College (1), Catholic U. (1), California (1), Fordham (4), Holy Cross (1), Iowa (1), Johns Hopkins (1), Loyola, Chicago (6), M.I.T. (1), N.Y.U. (1), Pennsylvania (3), St. Louis (2); *Classics* at Fordham (1), Frankfurt (1), Harvard (2), Johns Hopkins (1), Illinois (3), Oxford (2), Pennsylvania (1), St. Louis (1); *Communication Arts* at San Francisco State (1), Southern California (1); *Economics* at Fordham (1), Georgetown (5), Johns Hopkins (2), N.Y.U. (1), St. Louis (1), Wisconsin (1); *Education* at Boston College (2), Chicago (1), Fordham (7), Minnesota (1); *Engineering* at C.I.T. (1), St. Louis (1), Stanford (1); *English* at California (1), Catholic U. (1), Fordham (4), Harvard (2), London (1), Marquette (1), Minnesota (2), North Carolina (3), Oxford (1), St. Louis (3), Toronto (1), Yale (1); *Geophysics* at Columbia (1), St. Louis (1); *History* at California (1), Catholic U. (1), Columbia (1), Fordham (1), Georgetown (4), Gregorian (2), Harvard (2), Indiana (1), Loyola, Chicago (1), Notre Dame (1), St. Louis (4), Washington (1), Wisconsin (1); *Industrial Relations* at Cornell (1); *Language* at Chantilly (1), Chicago (2), Fordham (1), Harvard (1), Oriental Institute (1), Paris (1), St. Joseph's (6), St. Louis (2), Stanford (1), Vienna (2), Washington (1); *Law* at Columbia (1), Fordham (1), Georgetown (2), Gregorian (1), Harvard (3); *Library Science* at California (1); *Linguistics* at London (1); *Mathematics* at Boston College (1), Catholic U. (3), Chicago (1), Fordham (2), Harvard (3), Johns Hopkins (1), Javeriana (1), Kansas (1), Pennsylvania (1), St. Louis (3), Washington (1); *Medicine* at Marquette (1); *Music* at Harvard (1); New England Conservatory (1); *Philosophy* at Fordham (2), Freiburg (1), Gregorian (4), Louvain (4), Mainz (1), Munich (2), Paris (1), St. Louis (6), Toronto (2); *Physics* at Catholic U. (4), Fordham (2), Georgetown (2), John Carroll (2), Johns Hopkins (4), Louisiana (1), Maryland (1), M.I.T. (1), Rochester (1), Rockhurst (1), St. Louis (4), Stanford (1), Texas (1); *Political Science* at Georgetown (6), Gregorian (1), London (1), Paris Academy (1), St. Louis (2); *Psychiatry* at Georgetown (1); *Psychology* at California (1), Catholic U. (1), Fordham (2), Loyola, Chicago (3), St. Louis (1); *Scripture* at Biblical Institute (3); *Sociology* at Columbia (2), Cornell (2), Fordham (4), Michigan (1), St. Louis (3); *Social Work* at Brandeis (1); *Speech* at St. Louis (1); *Theology* at Catholic U. (6), Gregorian (11), Oriental Institute (1), Woodstock (3).

IV. DEGREE SOUGHT

	California	Chicago	Detroit	Maryland	Missouri	New England	New Orleans	New York	Oregon	Wisconsin	Total
Ph.D., new	3	4	4	4	5	6	3	8	4	1	42
Ph.D., cont.	18	9	14	16	11	10	7	24	5	18	132
S.T.D., new . . . . .	.	2	.	.	.	3	.	2	1	2	10
S.T.D., cont.	2	2	.	.	.	1	.	2	.	1	8
Other Doctor, new	1 ¹	.	.	.	.	.	.	.	.	.	1
Other Doctor, cont.	2 ^{2,3}	.	.	2 ^{14,15}	.	2 ^{4,5}	.	3 ⁶	1 ⁷	.	10
M.A., new	1	2	.	1	9	9	.	3	.	4	29
M.A., cont.	3	.	.	.	.	.	.	1	1	.	5
M.S., new	1	.	.	1	6	4	4	6	.	1	23
M.S., cont. . . . .	.	2	.	2	.	.	.	3	.	3	10
Other Master, new	2 ⁸	.	.	.	.	3 ⁸	.	.	.	.	5
Other Master, cont. . . . .	.	.	.	.	.	.	.	.	.	.	.
Other Degree, new	1 ⁹	.	.	.	1 ¹⁰	1 ¹¹	1 ¹³	1 ⁹	.	.	5
Other Degree, cont. . . . .	.	.	.	.	1 ¹⁰	.	.	.	.	.	1
No degree, new . . . . .	.	.	.	1 ¹²	.	4	.	.	.	2	7
No degree, cont. . . . .	.	.	.	.	.	3	.	1	.	.	4
Totals	34	21	18	27	33	46	15	54	12	32	292

¹ M.D.² S.E.O.D.³ J.D.⁴ S.J.D.⁵ D.O.L.⁶ Post-doct.⁷ LL.D.⁸ M.Ed.⁹ S.S.L.¹⁰ LL.B.¹¹ L.S.S.¹² Residency¹³ Fulbright¹⁴ J.U.D.¹⁵ J.C.D.

News from the Field

• **PERSONS:** *Rev. Joseph F. Mulligan, S.J.*, Chairman of the Fordham Physics Department, has been appointed to the Advisory Committee on Graduate Fellowships of the National Defense Education Act. He is the only representative of a Catholic college or university on this committee.

Father John J. Walsh, S.J., director of the Marquette University Players, returned to Marquette in October after six weeks' study of the theatre in Kyoto and Tokyo. He is assisting Dr. Alois Nagler of Yale University who is conducting a research project in Japan under a university grant.

The Fleur-De-Lis-Medal was presented by Fr. Rector to *Mr. David P. Wohl* for "kindness, goodness and benevolence." Mr. Wohl's \$500,000 gift, matched by grants under the Hill-Burton program, will enable the University to construct a 60-bed \$1,000,000 health institute at the School of Medicine for the treatment and study of mental illness. The hospital will be known as the "David P. Wohl Health Institute" and construction is expected to begin next year on the South Campus.

Father Darrell F. X. Finnegan of the University of San Francisco has been elected to a two-year term as President of the California Conference on Teacher Education. He is the first priest to hold this position.

• **STUDIES:** Guided by the wish to help "salvage humanity," *Boston College* has launched a hand-picked group of undergraduate and graduate students in a program to qualify them as teachers of mentally handicapped children. Dr. Katherine Cotter heads the team of educators who are offering courses in the education of the mentally handicapped, psychology of the mentally handicapped, special class methods, guidance for the mentally handicapped and their parents, occupational crafts and skills, and educational tests and measurements. Emphasis will be in training the young child of elementary school age with the hope that rehabilitation will not be as necessary or impossible later in life. Finding qualified teachers heads the list of special needs in the educational program for the mentally retarded.

A doctorate program in sociology began at *Loyola University, Chicago*, this fall. One of four such programs offered by the nation's Catholic institutions of higher learning, it will concentrate on social theory, problems, and organization.

Fordham University's College of Pharmacy is now accepting students

only for its new five-year program. The program was offered this year on an optional basis to entering freshmen, eighteen of whom selected the extended curriculum.

During the first two years of this program the students complete pre-professional studies. Professional studies will comprise the last three years of the course. The extended course of study will enable the student to penetrate into the pharmaceutical sciences as well as explore outside fields related to pharmaceutical work.

Two new programs in physics, supported by grants totaling \$9,740 from the National Science Foundation, have been inaugurated by the *St. Louis University*. An In-Service Institute for Teachers of Science will provide for about 20 full-time secondary school teachers taking late afternoon courses in physics at the University.

An undergraduate research participation program in physics has also been initiated. This calls for selecting about three qualified junior or senior students majoring in physics to work in the physics research laboratories during the academic term.

A cooperative plan to assist superior high school students in preparing for advanced placement examinations has been inaugurated by *Saint Peter's College* and *Saint Peter's Preparatory High School*, both of Jersey City, N. J.

To secure a basis for comparing the effectiveness of the plan the course in mathematics will be given by faculty members of the college and the course in English by faculty members of the college and high school.

Dr. Peter J. Stanlis, Associate Professor of English at the *University of Detroit*, will receive \$4,000 from the Relm Foundation of Ann Arbor. The grant is earmarked for a research project on eighteenth century political and social thought.

The chemistry department at *Xavier University, Cincinnati*, has instituted a "pilot program" of Saturday morning training for high school students in chemistry. Students from St. Xavier High School will take part in the experimental program. The objective of the program is to meet all requirements of the usual ten-hour course of the freshman college program.

• *GRANTS AND GIFTS: BOSTON COLLEGE*: received a pledge of two million dollars from His Eminence Richard Cardinal Cushing as a gift from the archdiocese when the Jesuit institution celebrates its centenary in 1963.

CREIGHTON UNIVERSITY: Dr. John M. McKain and Dr. Benedict Walske, members of the Creighton University medical faculty, have

been awarded a two-year \$19,778 grant for work in developing a new type operation to repair incompetent heart valves. The grant is from the U. S. Public Health Service.

FORDHAM UNIVERSITY will receive \$10,000 from the Woodrow Wilson National Foundation to assist graduate students in the current year. One-quarter of each \$2,000 subsidy can be used to strengthen the university graduate program.

The Physics Department at Fordham has received a grant of \$51,000 from the National Science Foundation to purchase a high-speed electronic computer to be used on four research projects being carried on by Profs. A. Weber, J. Shapiro, F. Canavan, S.J., and J. Mulligan, S.J. The computer, which will be housed in Freeman Hall on the campus, will be available to other departments of the university which require computer facilities.

During the June-December period a total of \$350,000 was realized in gifts and pledges. In addition to this a grant of \$100,000 from the James Foundation of New York, Inc. was fulfilled. Still another gift of \$25,000 was given to Fordham anonymously by a non-alumnus. Another foundation located in New York City made a gift of \$50,000 to be allocated toward the cost of building the new School of Social Service at Lincoln Square. A new Law Library will be built in the Law Center and paid for by 50 special donors. These men will contribute \$25,000 each for a share and will have their names inscribed on a memorial in the Law Center. Eight other shares totaling \$200,000 were pledged by alumni of Fordham Law. More than \$21,000 has been contributed by students and graduates of Fordham Glee Club for the new Student Center which will bear Fr. Theo. Farley's name.

GEORGETOWN UNIVERSITY has been made two three-year grants totaling \$289,756 by the John A. Hartford Foundation of New York City. A \$131,330 grant will be used for blood flow research under the direction of Dr. John C. Rose of the Georgetown Medical Center's department of physiology. Laboratory and clinical studies of kidney disease will be conducted with a second grant of \$158,426. Dr. George E. Schreiner, associate professor of medicine, will supervise the project.

LOYOLA UNIVERSITY, CHICAGO has been presented with \$1,150 from the Stans Foundation of Chicago to help underwrite a symposium for priests that will center around contemporary Protestant theology. The series, scheduled in April, 1960, will be entitled "The Priest in the Modern World."

MARQUETTE UNIVERSITY has been awarded two U. S. Public Health Service grants totaling more than \$300,000 for the School of Dentistry for research and training programs under the direction of Dr. Gunnar Ryge. Both grants are for a five-year period which began September 1. Dr. Ryge will receive \$85,675 for research in dental materials and \$327,222 for a training program. Another grant of \$80,000 for an experimental program in Dental Education to be directed by Miss Beth Linn, Dental Hygiene department chairman, who said the funds will be used to add five experienced dental hygienists to the staff to work with senior dental students. The four year grant will enable the Dental School to purchase new equipment including high speed drills and chairs with auxiliary seats so students and assistants can be seated during dental work.

National Science Foundation Grants totaling \$51,800 have been awarded to six faculty members of the Marquette faculty for research in chemistry, biology and physics. The largest grant, \$16,000, was given to Kiuck Lee, assistant professor for physics, for research on "Pear Shaped Nuclear Deformation." A \$15,000 grant was given to Arthur G. Barkow, physics professor, for work on "Elementary Particle Reactions in Photographic Emulsions." One of the largest grants ever to be given to a member of the Chemistry department, \$14,000, has been awarded to Walter Stricks, an associate professor. Stricks' research is titled "Polarographic Studies with the Rotated Dropping Mercury of Electrodes." The three grants are for a two year period. Walter G. Rosen, assistant professor of botany, received \$4,000 for a year's study of the "Influence of Streptomycin on Chlorophyll and Chloroplast Syntheses." Peter Abramoff and Rezneat M. Darnell, assistant professors of biology, were given \$4,200 to study the blood chemistry of local amphibian populations.

The members of Mr. Oscar Plotkin's family, director of three tanning and leather goods firms in Milwaukee, have given \$71,000 to the Medical school to be used for research on Alzheimer's disease and related neurological disorders. Additional contributions given in the name of Mr. Plotkin will bring the total to \$100,000.

Marquette U. School of Medicine has been given a grant of \$85,688 covering a two-year period to be used to teach medical students the concept and basic techniques of rehabilitation. The grant was given by The National Foundation.

ST. LOUIS UNIVERSITY has received a gift of \$1,050,000 by Mrs. Harriet Frost Fordyce. The gift includes \$400,000 for the establishment of an endowed professorship in psychiatry to be named for her late

husband Samuel H. Fordyce. The remaining \$650,000 of the gift is an unrestricted amount to be used for other University priority needs. David P. Wohl donated \$500,000 for a psychiatric clinic earlier this month.

A gift of \$100,000 was presented to the University by the McDonnell Aircraft Corporation in commemoration of the firm's twentieth anniversary. The University was chosen because 300 of its graduates are currently McDonnell employees.

St. Louis University School of Medicine received a March of Dimes grant of \$15,737 from the National Foundation to be used on basic research on the part played by protein in the multiplication of viruses.

The U. S. Public Health Service awarded grants totaling \$361,761 to the St. Louis University school of Medicine from September through November. A gift of \$500,000 from Anheuser-Busch, Inc. for the University's 150th Anniversary Development Program was announced to be used for a new Student Citizenship Center. This Center will provide a "town hall" type meeting place for residents of the area and student union facilities for the campus.

THE UNIVERSITY OF SAN FRANCISCO received a grant of \$8,778 from the Federal government recently to be used toward equipping a health research facility. The grant was the second part of a stipend totaling \$100,000 from the Federal government for the construction and equipping of a science building.

A grant of \$46,500 from the National Science Foundation to conduct a six-week summer seminar for high school mathematics teachers was also received. Fifty teachers will participate in the institute, under the direction of Edward J. Farrell, Assistant Professor of Mathematics at USF, and will receive \$75 per week stipend plus dependency and travel allowances while attending the six-week session.

WHEELING COLLEGE announced the Rev. Joseph A. Duke, S.J., Associate Professor of Chemistry, has received the largest grant in the college's history. The award, which provides \$26,000 for basic research in the field of biochemistry, was made by the National Institutes of Arthritis and Metabolic Diseases of the National Institutes of Health, Public Health Service.

XAVIER UNIVERSITY announced a grant of \$38,800 from the National Science Foundation for their physics department to be used for a six-week institute for high school physics teachers next summer.

• *BUILDINGS*: Architects' plans for a \$800,000 chemistry building were approved by *Gonzaga University*. The plan calls for a two-story, reinforced concrete and brick structure. It is tentatively set for completion before 1962 when Gonzaga will celebrate its 75th anniversary.

The proposed building will provide facilities for undergraduate, graduate and research work. It is equipped for students in chemistry, engineering, physics and for those in the fields of pre-dental and pre-medical.

The *Houston Post* had the following editorial to announce the opening of *Jesuit High in Houston*, a new venture of the New Orleans province:

"Houston has been honored by being selected by the Society of Jesus as a site for one of its college preparatory schools for boys. The new school, expected to open by 1961, will be the 45th such school in the United States operated by the Jesuits. The order also operates 27 universities in this country.

As has been the case with many other fine things in this community, the new school is being made possible by the generosity of public-spirited Houstonians. An 83-acre tract of land for the school on Bellaire Blvd. at Gessner Road was donated by Mr. and Mrs. Frank W. Sharp. The land value is estimated at \$830,000. Houston alumni of Jesuit universities and preparatory schools propose to contribute \$500,000 to initiate the building program. Undoubtedly there will be substantial contributions by others as work progresses.

The Rev. Michael Kennelly, former president of the Jesuit College Preparatory in Tampa, Fla., who came to Houston to conduct negotiations for building the school here, said the aim of the Jesuits is to give this city another college preparatory school geared to preparing its students for any college or university in the nation. In what may have been unintentional understatement, he added that 'the curriculum will contain no easy courses.' Jesuit educators from the time of St. Ignatius of Loyola have believed in the value of hard work.

Dedication ceremonies for the Andrew White Student Center at *Loyola College, Baltimore*, were held on Sunday, January 31.

Named in honor of Father Andrew White, S.J., who came to Maryland with Lord Baltimore's founding party in 1634, the center was built at a cost of approximately \$750,000 and is the first new building to be erected on the Loyola College campus since 1951. It contains student activities offices, cafeteria, lounge, campus shop, rifle range, service facilities and a faculty dining room and lounge. The building releases for appropriate academic use many portions of space in existing buildings.

Reverend Vincent F. Beatty, S.J., President of *Loyola College*, said "The Andrew White Center completes another phase of a long-range development program begun in 1956. Plans are nearing completion for an Engineering-Physics Building with construction scheduled to begin this year."

Loyola University, Chicago, has announced plans for a \$92 million "Horizons for the Centuries" 40-year expansion program which will develop three existing Chicago educational centers and one new area.

"An initial phase of six buildings at the cost of \$29,250,000 plus \$7,500,000 for operational budget support will be completed by 1970 to coincide with Loyola's centennial year of educational service to Chicago and the nation," according to university president, the Very Rev. James F. Maguire, S.J.

"The program's second phase, in process during Loyola's second century from 1970 to 2000 calls for 15 additional buildings at an estimated cost of \$19,625,000 plus \$36 million in operational budget support," Fr. Maguire continued.

"The 'Horizons for the Centuries' plan, the result of a four-year faculty committee study, will permit Loyola to anticipate the educational needs of the Chicago area before the lack of proper facilities becomes a desperate reality," Father Maguire explained.

It will include expanded dental and medical community services in addition to broader educational facilities for all of the schools of the university, the university president said.

Major projects scheduled for completion on the Loyola campuses during the next decade include:

An \$18 million medical center (teaching hospital and medical school) in northwest Chicago on the Skokie border;

A \$3.25 million university center-classroom building on the downtown campus, Rush and Pearson streets;

A \$5 million dental school and clinic in the west side medical center, Congress and Hoyne;

A \$1.5 million science classroom building on Loyola's Lake Shore campus, 6525 N. Sheridan Rd;

A \$1.5 million university center on the Lake Shore campus. "In the initial phase of the 'Horizons for the Centuries' plan, high priority is given by the university to the medical center and the university center on the downtown campus," Father Maguire pointed out.

"Funds for the new Loyola buildings of the next ten years are expected to come primarily from corporate and individual donors as well as foundations and federal funds. In the case of the dental school, the annual

dental alumni fund is reserved for the school's construction," he explained.

In addition to these six new buildings the university president described Loyola's projected \$19,625,000 development program during the second phase, 1970 to 2000:

Among new facilities planned for the near north campus are:

A 1,500 seat auditorium, \$1.5 million; school of commerce, \$1.5 million; two residence halls, \$1.5 million each; library building, \$3 million; gymnasium, \$1 million.

The university's present nine-building Lake Shore campus will be expanded by the year 2000 to include the following buildings and others:

Administration building, \$750,000; two residence halls, \$1.5 million each; Cudahy Memorial library wing, \$750,000; women's gymnasium, \$500,000; Alumni gymnasium wing, \$750,000; fine arts center, \$875,000; auditorium, \$1.5 million; ROTC armory, \$1.5 million.

All estimates, Father Maguire indicated, are based on current construction prices.

A classroom building costing in excess of one million dollars now under construction at *St. Joseph's College, Philadelphia*, will be completed by May 1960. It will provide seating space for more than 1,600 students in thirty-one classrooms and office space for forty-five professors.

Bids were submitted in mid-September for a student center. Plans are nearly complete for a new library.

The *University of Santa Clara* has announced the beginning of work on their Engineering Center. The design calls for a "U" shaped court surrounded on three sides by classrooms and laboratory facilities for Civil, Mechanical, and Electrical engineering.

In the near future a fourth building for extra classrooms and drafting classes will be added to complete the "quad." The estimated cost is \$870,000.

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