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Acceleration: Disgrace or Challenge?

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MARVELOUS TECHNOLOGICAL ADVANCES in industry, promising enrichment of American life, were achieved during the war by the united efforts of physicists, chemists, and engineers. For a brief period at the beginning of the war American higher education seemed also on the way toward notable breaks with tradition and gains in efficiency, but the early promise is unrealized. A lengthened school year was so generally the one mthod of increasing educational production that to most people now acceleration unfortunately means only calendar change. Better methods are neglected. It is as though American industry had tried to meet war needs merely by lengthening the work year! Little wonder that now college faculties, wearied by overwork and dubious of such an expedient, are urging return to the "normalcy" of prewar programs.

But at just this juncture these institutions, still short of staff and facilities, face an unprecedented flood of students; moreover, great numbers of them are older and eager to complete their education quickly. Sound means of acceleration seem needed as never before. Also, these older students make insistent the question as to how far into the adult years higher and professional education should extend. The purpose of this paper is to consider briefly whether psychology and scientific education may not be in a position to offer very important and timely evidence regarding (a) the desirable limits of such extension and (b) means of facilitating the educational process, if such means appear needed. The challenge is to educational enterprise and resourcefulness. It seems hardly too much to say that failure a second time to meet this need would be little short of disgraceful.

Desirable Ages for Completion of Higher Education

The conventional age at which the American child enters school is six, or shortly before the sixth birthday. Now almost everywhere elementary and secondary education total 12 years; collegiate programs, 4. As a result of inertia and agitation against acceleration, few students before the war moved more rapidly than the lockstep rate of a grade a year, bringing college graduation most commonly at 22 or less often at 21—at The Ohio State University, for example, only 4 per cent graduated under 21. Further, the number taking graduate or professional training very rapidly increased, making completion of training for these individuals yet later. Thus, the prewar median age at which the doctorate was received in American universities was 32. In contrast, the median age at which this degree was received in German universities, in the golden age of German science before 1914, was 24—a result chiefly of the shorter German program of general education (*5*).

Agitation for earlier completion of training goes back at least 60 years to President Elliott, of Harvard. Thirty-five years ago President Lowell (*3*) returned to the issue with a statement of notable vigor and clarity:

> With the long period of special training now required in every profession, there is a universal cry that men are beginning their careers in life too old, and that the period of education is too long. Disease and death are not postponed because a man starts upon the practice of his profession a year or two later than is necessary. His period of active life, his achievements and his usefulness are simply curtailed to that extent. . . . Much has been said about maturity, but that is the result less of age than of environment and responsibility. Maturity may easily become overripe (pp. 255–256).

Surely, with the present great numbers of older students this problem now presses as never before.

The first issue is that of relations of age to success in college. Studies at Harvard, Columbia, Dartmouth, and elsewhere, going back over 30 years, were in general agreement that the younger student did the best academic work, least often presented disciplinary problems, and participated normally in student life. The issue suddenly assumed special importance at the

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beginning of the war because of efforts to bring about college entrance at an earlier age for young men about to be drafted. Extensive study of the problem, then begun at The Ohio State University, was fully in agreement with these earlier findings. It was found that younger entrants were more likely to graduate and that younger graduates had the best academic record. Moreover, statistical analyses indicated that although the younger students averaged brightest as shown by the test of general ability given at entrance, superior ability seemed not the only factor; and many very bright students who might presumably have finished their schooling young did not do so. Further, the accelerates as a group were not socially maladjusted: they took part in more activities than did the older students and rated highest on questionnaires regarding health and emotional adjustment. Where maladjustment was found, it appeared usually avoidable with better selection and guidance and particularly if the educational lockstep and rigid grade stratification both academically and socially, from the first grade through high school and indeed college, could be broken up, acceleration thus becoming more common and more socially accepted. The underage student who was intellectually and emotionally distressingly immature was also much more rare than was often supposed; but usually overlooked were the far more numerous able youngsters who were held back to the lockstep pace and had to "adjust their stride . . . to colleagues inferior to themselves . . . and mark time academically until the calendar should release them" (*2*, pp. 23–26). Practically all the investigations agreed that not the younger, but the older, students did poorly academically and fitted college life least well. Does the record of the returned veteran contradict this last conclusion? He is a special case, his maturity and wide knowledge gained at tragic cost. And possible effects of late completion of education upon adult career should here especially be considered. This issue must now be turned to.

It is frequently argued that even though younger students do well in school, they do not in adult careers, because they are maladjusted or initially too immature. This problem has been studied less, although it was known that highly successful alumni had tended to graduate younger than average. Three exploratory investigations were therefore made. The first, based on the very complete alumni records of an eastern college, involved careful appraisal of the careers of 924 American-born graduates between 1880 and 1900 who lived to be 50 or over. The proportion nationally known decreased strikingly from 29 per cent graduating at 19, to none graduating over 26, and failures were most common among the older, not the younger, graduates. Comparative evidence indicated that superior ability of the younger was probably not the sole determining factor. A second study by Marie A. Flesher, reported in the *Educational Research Bulletin* (1945), compared alumni of 15 years ago of the College of Education, The Ohio State University, graduating at 20 or younger, with classmates graduating at 22 and paired with the younger as to ability on the entrance test and academic record at graduation. This again showed the younger to be the more successful as indicated by salaries and professional status. A third investigation compared two groups of famous Americans, one born about 120 and the other about 60 years ago. Members of the latter group finished their education over two years older *and* attained their first outstanding accomplishment also two years later, while many of the earlier group did notably at ages now usually spent in college (*4*). Although the factors involved in the above studies are exceedingly complex and although the first and third lack controls, the evidence is consistent that early completion of education is not a handicap to a later career but rather is associated with success, and that notable accomplishment may come at ages now commonly pre-empted by full-time education. There is also evidence that prolonging full-time education delays marriage and may be a factor in the low birth rate in the case of parents with college or professional training.

Progress through educational programs at ages earlier than those conventional before the war thus appears to bring greater success for many students both in school and after. Why? A first factor is well established. Individual differences in abilities are so great, and many very superior youngsters mature intellectually (and in many cases also physically and emotionally) so early, that the educational lockstep retards them seriously. For instance, the Carnegie-Pennsylvania studies showed 14 per cent of the 17-year-old high school seniors scoring above the college senior mean on a comprehensive test battery supposedly covering the essentials of a college education (*2*).

A second factor has yet to be adequately studied. However, there is evidence to suggest that the most rapid and marked physical changes in the entire life span occur at around 18 to 20 years of age, when maturity is reached, and that there are then concomitant changes in personality, including a decrease in the exuberance of free-ranging interests needed to give vitality to general education and increased urge for socioeconomic and intellectual independence, marriage, and the beginning of a life career. Much subsequent delay in realization of these urges, because of continuing school, might be psychobiologically unhealthy.

Regarding the third factor there is much evidence. Curves showing changes in morbidity and mortality, strength and quickness, and competence in sports throughout the life span indicate the physical peak to be in the late teens and twenties with a decline thereafter, at first slow but later more rapid. Other things being anywhere nearly equal, it would seem desirable that an individual should begin his life work, and more generally his total adult life experience including marriage and establishment of his independent adult career, in this period of greatest physical health and vigor. Moreover, the physical prime should indicate something about the period of the prime in total organic development, including also intellectual vigor and capacity for accomplishment. Roughly, this seems to be so. Tests of "mental alertness" given through the adult years show the peak in the late teens or early twenties. Greatest enthusiasm and devotion to a cause seems to come most often in the twenties, with a settling back to more sedentary interests with middle and later adult years. The notable studies of Dr. Lehman regarding age of greatest accomplishment of famous men in creative work show the peak in the late twenties and early and middle thirties. Urgency is thus given to Lowell's argument: this period of greatest creative potentiality clearly is not postponed because a man starts late upon the practice of his profession and may be heavily invaded by undue prolongation of full-time education.

Evidence regarding success both in and after college and regarding individual differences, development, and change throughout the life span thus seems to argue for earlier completion of full-time education than was usual before the war, to point to the need of acceleration for those whose education has been interrupted by the war, and warrant consideration in discussions of required military training. But are there satisfactory means by which individuals or groups may move through educational programs more rapidly than the conventional rate?

Results and Means of Educational Time-Saving

First it must be recognized that efforts to shorten educational programs also have a long history. At least two northern cities as well as numerous southern communities have had 11 instead of 12 elementary and secondary precollege years. When students from such 11-year programs went on to college, most evidence seems to be that at least by the senior year they did as well as students from 12-year college preparatory programs. Most of the considerable number of careful experiments regarding the acceleration of superior children have been favorable. One group, for example, did three years of junior high school in two years. Both the tests given at the end of the three-in-two program and academic records in the following school year showed practically no loss as compared with students of equal ability who took the usual three years. There was very little social maladjustment; in fact, gains in maturity were reported.

Efforts to shorten college programs also go back 75 years (*1*), when completion of general education at the end of the sophomore year was widely discussed. Present programs at Stevens College and the University of Chicago are not new in this respect. Efforts to shorten the four-year program to three were made at Harvard, Cornell, and Johns Hopkins; Clark had such a program for 20 years. A general attempt to shorten college programs seems to have come, however, only with the recent war.

The Ohio State University has for almost 25 years been on the quarter plan and therefore more flexible in its programs than many institutions. Yet in the essentially prewar graduating class of 1941–42 in the colleges of Agriculture, Arts, Commerce, and Education only 3 per cent of the students who had all their college work in this institution took less than the conventional time (the fourth June after entrance or equivalent total of three years, nine months, over-all elapsed time), and only 1 per cent finished in three years or less. However, in 1944–45 the accelerates increased to 35 per cent, with 22 per cent finishing in three years or less.

How did these accelerates make out? In the above-mentioned undergraduate programs, and with acceleration and its amount optional, most did well. (In difficult technical curricula such as medicine, and where acceleration is required of every student, the situation and the outcomes are different.) In a typical study, 76 women in the above-mentioned colleges who attained a degree in three years or less were paired with others who had taken the regular time, entered at the same age, and had the same score on the entrance test of general ability. The final academic record of the accelerates was found actually to be somewhat higher than that of the paired cases, presumably as a result of stronger motivation and better study habits. Both groups were decidedly superior to the average student (accelerate point-hour ratio, 3.06; controls, 2.78; average for all women, 2.71). Moreover, the accelerates were almost as active in student affairs as the paired cases and more so than the average student, in spite of the fact that activities are, in great part, organized on a three-quarter, four-year basis. The accelerates were interviewed and also filled out certain questionnaires and check lists. A few cases complained of the burden of the accelerated program or appeared to have attempted beyond ability or energy, but most of

these were also earning their way or had emotional problems usually connected with the war. The majority of the accelerates showed no unfortunate outcomes. It was also found that students who began an accelerated program were more likely to stay with it and graduate than those moving at the conventional pace. In short, the conventional rate in the usual undergraduate program appeared set for the average or below-average student, and a faster pace seemed normal for the more able.

This acceleration was, however, gained mostly by four-quarter attendance and next by heavy course loads—two very clumsy methods tantamount to lengthening of the work year or overtime in a factory. Although many students took all this in stride, others complained. Might not methods be used which, like technological advances in industry, would *save* time and labor for both students and faculty? Two very simple investigations will illustrate two possibilities. The first concerned credit by examination in chemistry. At the start of the quarter, students in the beginning course took a placement test, those scoring approximately in the upper 5 per cent receiving credit by examination for the first course and moving into the next. It was found that of 365 students who in the past six years had received examination credit 51 per cent had made A, 30 per cent had made B, and only 1 per cent failed in the second course; but of 904 students who had actually taken the previous course, 8 per cent made A and 20 per cent B, while 11 per cent had failed. Students scoring just below the critical point for giving examination credit for the most part also did very well in the second course. It was concluded that the number given examination credit might be increased, and that if a brief statement regarding the content of the first course and the nature of the examination were made available to entering students and high school teachers, good students might be so aided in preparation for the examination that the number might be increased still further. Such a step would encourage good students, move them through the university faster (and thus relieve congestion as to housing, classroom space, and staff), stimulate high school teachers to help good students, and more generally encourage good high school teaching. If the same steps were taken in English, history, geography, physics, and biology, an appreciable number of students might thus dispose of one or two quarters of college work.

Another simple adaptation to the needs of students superior in ability and preparation has been tried at a number of institutions. One experiment made use of this in both moderate and marked degree. Out of some 600 students enrolled for a course in educational psychology, two "accelerate sections" were made up of students superior in ability, preparation, and motivation. It was felt that, because of their superiority, they needed less instruction, and therefore they met three times a week instead of the usual five. In addition, an "acceleration seminar," comprising very superior students, was formed. Only six intensive evening meetings were held during the entire quarter, plus individual conferences. On an objective final 27 per cent of the regular students made A or B, 53 per cent of those in the accelerate sections, and 94 per cent of those in the accelerate seminar! The less teaching the students received, the better they seemed to do.

After all, might this not be expected? How bungling, stupid, time-wasting, and even perverse many a college class is! No systematic account is taken of students' initial knowledge of the subject; included are some who, at the beginning, already are able to pass the course. Somewhat as a fleet goes only as fast as the slowest ship, so such a class tends to move at the pace of the slower (the low C or D) student. Because of the greater interest in helping the poor student than in facilitating the able, much time is spent on explanations and procedures not needed by the abler students. Often the lecture method is used in medieval fashion to present material by word of mouth, when the same matter is available in better form and could be read by the students in one-fourth the time. Our culture pattern tends to inhibit the able and to motivate for no more than the gentleman's grade. And what a stupid distribution of time—50 minutes a day, scattered over five days in the week and continued over a quarter or semester, with much going and coming, picking up the work and then soon dropping it, over and over again. When in real life an efficient person begins an undertaking, he surely first takes stock to see where he is and then tries to arrange substantial blocks of time for intensive work in order to complete that undertaking. Why not set up work for our students in such ways, as the "seminar" tried to do? Such methods would seem especially appropriate for returned veterans, eager to complete their full-time education and begin their careers. These methods also save time for the staff and relieve classroom and housing congestion.

Various other means seem feasible. Self-instructional practice exercises have been successful in the services and from elementary school to college. Combinations of two or more related courses, and certain very simple practical experiments with prerequisites, have also worked well. The Commission on Implications of Armed Services Educational Programs, appointed by the American Council on Education, will doubtless have valuable suggestions. And if, largely

by the crude methods of the lengthened school year and school day, a fifth of our students can complete a four-year program in three, such technological gains should bring more marked savings of time and effort for both students *and* institutions. The above takes no account of possible curricular pruning and coordination, which might effect further savings.

Résumé and Recapitulation

Wartime acceleration was by no means an isolated war-caused episode, but rather a reappearance of a long-recognized problem. Early and recent studies are in agreement in indicating that younger students tend to be the best students and that the educational lockstep has tended to slow the progress of the ablest students to the rate of the average. Available data agree that early completion of collegiate education tends to be associated with success in adult life. All these conclusions appear supported by basic psychobiological data indicating that American higher and professional education, before the war, had tended to extend beyond the ages of greatest readiness for such learning and to encroach upon the best years for beginning adult socioeconomic life. These problems are now being accentuated by interruptions in education resulting from the war. There is evidence also that wartime acceleration, although for the most part hastily planned and crude in method, was often successful, and scattered but challenging evidence indicates that better methods are available or might readily be devised which would permit more, and better, acceleration. Since the majority of our youth have had their education interrupted, since there is a shortage of individuals with advanced and technical training, and since most universities are swamped with students, the closing question is: What may be done to meet this situation?

The great need is for a reorientation of faculty thinking with regard to this whole problem. Faculties are correct that all-year school endangers their health, restricts their research and scholarship, and makes some students stale and narrow; that mass acceleration, especially in professional schools, asks too much of average and below-average students; and that the heavy schedules of the war period were exhausting for faculty members and many students. The proposals do not involve lengthened school years or heavier course loads for either the faculty or most students. They involve, not mass acceleration, but selective acceleration in proportion to ability, thus facilitating the work of both faculty and students. Faculties are right that standards should not be lowered, and since academic units are ordinarily expressed in terms of time taken (a four-year curriculum or a five-hour course), reduction of years or hours becomes suspect. The unsatisfactory nature of such terms would, however, seem clear: charges of lowered standards against efforts to save time are perverse. Faculties are right that education should not be hurried, but that fact does not justify unnecessary extensions of educational programs into the best years of young adulthood. Faculties are right that gain in intellectual maturity is a major goal of education, but there is evidence that undue extension of educational programs tends rather to prolong adolescence, and that maturity may be furthered by desirable acceleration. Faculties are tragically wrong in the persisting attitude that somehow ingenuity, imagination, and efforts at time and labor saving are inappropriate in higher education, and that during the war or now with the flood of returning veterans all they can do is to lengthen the school year or school day or add staff to do the same old things in the same old way. Continuing practical experimentation to facilitate the work of the faculty and the progress of students should become a regular and expected part of the work of an educational institution. Technological advances *are* possible in education.

We all thrill when advances in medicine add years to life. Such steps as mentioned above could, in effect, add years to the productive adult life of our ablest young people, markedly increase the efficiency of our educational institutions, and aid faculties in the present emergency. If only such steps could be taken now, at this time of greatest need for them, there might be notable advances not only in science and industry but even in education!

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Scanning Science—

With the exception of the advancement of scientific research there is no subject more important to men of science than the adequate teaching of the sciences in our colleges and schools. The efforts now being made by the Natural Science Department of the Educational Association to properly coordinate higher and secondary scientific education should be heartily supported, and those who have read in *Science* the addresses by Profs. Bessey, Carhart, Freer, Jordan, and Gage, at the recent meeting of the N.E.A., will understand what excellent leadership controls the movement.

—4 September 1896