Contributions to

FURTHER STUDIES OF A TECHNOLOGICAL UNIVERSITY

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School of Research in Education,
University of Bradford, 1969

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Preface

In 1966 the University of Bradford, soon after receiving its Charter, established a School of Research in Education under the inspiring leadership of Professor Frank Musgrove to conduct longitudinal studies of the first three cohorts of students entering it as a university.

The leading institution in Bradford had long aspired to become a university, enviously eyeing the prestige and status which the university in nearby Leeds conferred upon the city. The University of Bradford had its origins in a technical college formed in 1882 from a Mechanics Institute and a School of Weaving. Almost from the first it began to press for university status, but the break through did not come until 1957 when as part of the re-organisation of the technical colleges sector, a section of the Bradford Technical College was budded off to become one of the ten elite Colleges of Advanced Technology (CATs). Only eight years later, in 1963, the Robbins Report on Higher Education recommended that the CATs be elevated to universities, and the University of Bradford was born.

Having at last achieved its long-held ambition, the University began to take itself very seriously. One of its first actions was to set-up a School of Research in Education with the task of studying the University to see how it could improve. The extent of the University's commitment was underlined when its Senate mandated the Schools of the University to grant up to six hours of each of their students' time each year to the School of Research in Education to take part in its longitudinal studies. It was up to students whether or not they participated, but it was not open to the Schools to block them. The Students' Union was very enthusiastic about the project and encouraged the students to take part.

By 1966 Professor Musgrove had assembled an embryonic team and the first tranche of tests and questionnaires went out to the 1966 entry. A year later an ambitious team of six was in place, which energetically and enthusiastically set about its task. It was supported by academics in other parts of the University and also students on an MSc course in the Psychology and Sociology of Education which the School had instituted. This master's degree turned out to be an excellent route for teachers wanting to become lecturers in the newly-formed polytechnics and was very popular.

The School of Research in Education was a substantial investment by the University and Frank Musgrove was very keen to prove its worth. One way he did this was by compiling in large foolscap volumes the papers published, or about to be published, by members of the research team and associates on the development of a technological university. The first, *Preliminary Studies of a Technological University*, appeared in October 1967. This was followed two years later by the three volumes of *Further Studies of a Technological University*.

Later still there was *Sandwich Course Studies* which looked in detail at the attempted integration of the work and university components of the degree courses. Sandwich courses had become talismanic for the University, which rightly believed that the range it had offered including in erstwhile academic studies such as biology, had played major part in it being designated one of the elite Colleges of Advanced

Technology. Sandwich courses also became the subject of my Master's degree thesis and studying them in detail was an important part of my retraining as an educational researcher. The thesis gave rise to a book, *Sandwich Courses: an integrated education?* which is reproduced elsewhere in the Archive. It was not well received by the University since it was altogether too questioning for its liking.

This digitized report contains the 14 papers I contributed to the three volumes of *Further Studies of a Technological University,* reproduced in the order of their placing among the 42 papers which make up the volumes. The other chapters are listed in the Contents, but are not reproduced.

I had joined the Bradford research team in September 1967 as a research fellow, coming directly from a lectureship in plant physiology at Birkbeck College London. It was in writing these papers that I cut my teeth in education research.

Alan Smithers
14 October 2020

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Chapter 4: Why Choose Pharmacy?

Summary

Too few well-qualified school leavers are choosing pharmacy. An inquiry amongst applicants and entrants to the School of Pharmacy at the University of Bradford suggests that the nub of the problem may be competition from medicine for a population of sixth formers unusual in the sense that they have read science, but are also people-oriented. Serious consideration should be given to the possibility of admitting students with mixed 'A' levels to pharmacy courses.

Introduction

The recruitment position in pharmacy is far from satisfactory. Fewer students are entering the Schools of Pharmacy than in 1964-5; of those who do enter about 17 per cent fail to complete the course successfully, and a further l2 per cent fail to register with the Pharmaceutical Society[1]. The shortfall has occurred particularly amongst male British students.

Statistics of the Universities Central Council on Admissions[2] show that pharmacy tends to be under-represented amongst the best qualified. In 1965 only 41 per cent of the new entrants could be classed as having good 'A' levels compared to 58 per cent in biology, 71 per cent in biochemistry, 68 per cent in chemistry, 78 per cent in mathematics and 69 per cent in physics. Problems of recruitment may become even more severe in the future. If the projections of the Dainton Committee[3] are correct then there are likely to be fewer science sixth formers to meet the expanding needs of the various science-based professions.

The reasons why individuals come to choose one occupation rather than another are complex. But it is possible to identify a number of factors in the individual and in society that are likely to be key. Important personal factors include an individual's abilities and educational attainments, what knowledge he has of the opportunities available, what values he holds and what personality needs he hopes to satisfy in his future career. But the individual will not have a completely free choice among all occupations. The effective alternatives will be delimited in a variety of ways, for example, by formal and informal entrance requirements. Thus for some professions the prospective entrant may not only have to meet a certain standard of 'A' level performance, but in addition, but also conform to social expectations (engineering, for example, is still considered by some to be inappropriate for girls). Occupations will also differ in the amount and type of rewards that they offer. Some will provide a high level of financial return, others (social work, for example) may not do so, but will provide considerable opportunities for working with people and being helpful to them. The attractiveness of different kinds of reward will depend on the individual's values.

There has been little systematic attempt to discover why students choose to make their careers in pharmacy. The present article is a contribution to this field. It describes the occupational orientations of one year's entry of pharmacy students into a technological university and makes comparisons with students studying other subjects in the same intake.

Methods

All students entering the University of Bradford in 1966 were asked to complete a number of questionnaires relating to their career aspirations and expectations. Seven hundred and fifty seven (95 per cent) returned usable questionnaires including 71 (96 per cent) students of pharmacy. Of the pharmacy students 53 were male.

Students were asked to indicate the general field of employment that they may have had in mind two years and one year before entering university. If these choices differed from their choice on entry, students were asked to outline any reasons for the change. Respondents were also asked to tick one of the following statements to indicate their degree of satisfaction with their present work expectations:

- very satisfied; this is the work I really want to do and see myself in;
- this is the work, which if not ideal, is likely to suit me;
- no particular feelings of satisfaction or dissatisfaction;
- unsatisfied, but will probably put up with it;
- very unsatisfied; shall eventually seek a change.

Students were also asked what they wanted from their future careers. Following Rosenberg[4], students were asked to indicate on a three-point scale the extent to which their future career would have to satisfy ten possible requirements (these are listed in Table 1) before it could be considered ideal. The three points on the scale were labelled: (1) of high importance; (2) of medium importance and (5) of low importance.

Results

Decisions to take pharmacy tended to be taken relatively late in students school careers. Of the 68 students who responded to the question about career preferences in the years before entering university, 22 (32 per cent) had decided on pharmacy at least two years before entry, 27 (40 per cent) at least one year before entry and 19 (28 per cent) during the year prior to entry. In other vocational disciplines the proportion of 'early choosers' tended to be much higher. Amongst undergraduate business students[5], for example, 74 per cent had held to their career choices in the two years before entering university.

Of the 22 pharmacy students who had made an early decision, 7 had fathers who were themselves pharmacists compared to only 2 of the other students. Of the 29 students whose preference changed to pharmacy at least one year before entry, 8 had originally preferred some aspect of chemistry and 6, medicine or dentistry. Of the 19 students whose choice had changed to pharmacy during the year before entry, 15 had originally wanted to enter some branch of medicine, 2 dentistry and 2 chemistry. That is, 21 students in this group reported having aspirated at some time to qualify in medicine or dentistry. Twenty-five students gave reasons for changes in their career expectations. Twelve referred to failure to gain admission to a medical school because of inadequate 'A' level qualifications or some other disability. For example:

> 'I did not have a language and because of this I was unable to obtain a place in medicine.'

> ‘There is far too much prejudice against accepting women for medical courses and, in addition, extremely high grades of ‘A’ level passes are required.’

Two other students had turned to pharmacy on rejecting other prospective occupations:

> ‘Left agriculture because of its present state in this country.’
>
> ‘I went to university and took dentistry, but did not like the course and decided to change to pharmacy.’

More positively perhaps seven students turned to pharmacy as a result of an increasing awareness of their interests and abilities:

> ‘Effect of doing ‘A’ level biology course in only one year has opened up new interests.’
>
> ‘I was advised by a career’s officer to stay on at school and take ‘A’ levels. Halfway through my sixth form career I realised I had the ability to go to University and so obtain a better job than a technician.’

Three other students emphasized that they saw in pharmacy an opportunity to satisfy particular values, for example:

> ‘A change from office work (original choice: accountancy) to be able to be in contact with more people.’

Experience of working in a pharmacy was the deciding factor for two students, for example:

> ‘Not until I started part-time work in a dispensing pharmacy did the job appeal at all. But my closeness to the profession was the main reason for my choice.’

Most students were satisfied with their new choice, for example:

> ‘My qualifications were insufficient to obtain a place in Medical School. Pharmacy has always been at the back of my mind as an alternative, and now it has come up I am quite satisfied.’

Of the 64 students who indicated their level of satisfaction with their present career expectations, 45 (70 per cent) were ‘very satisfied’ and 15 thought that ‘the work, if not ideal, was likely to suit them’. Only 4 had no particular feelings of satisfaction or dissatisfaction, or were dissatisfied. This compared very favourably with students in other fields of study. Seventy per cent of engineering students[6], for example, were ‘very satisfied’ with their future career prospects on entry to University.

In indicating their reasons for coming to prefer pharmacy several students mentioned the wish to work with people and to be helpful to them. People oriented values appear to be a distinctive feature of pharmacy students compared to other students from science backgrounds. Table 1 shows that significantly more pharmacy students than students in all other groups indicated a wish to be helpful to others in their future careers. In wanting to work with people they differed from students of engineering and applied science, and resembled students of arts and social science. They were also

like students of arts and social science in attaching lower importance than the technologists to earning good money.

Table 1: Occupational Values of Freshmen[1,2]

Item	Pharmacy (N=51)	Engineering (N=276)	Applied Science (N=194)	Arts and Social Sci (N=82)
Enable me to look forward to a stable, secure future	71.6	74.6	76.8	51.2↓
Provide an opportunity to use my special abilities	66.1	75.4	78.4	81.7
Give me an opportunity to be helpful to others	62.3+	26.1	35.1	41.5
Give me an opportunity to work with people rather than things	45.3	21.0↓	22.2↓	59.8
Provide me with a chance to earn good money	43.4	64.9+	60.8+	32.9
Permit me to be creative and original	26.4↓	54.7	55.7	48.8
Leave me relatively free of supervision by others	24.5↓	43.8+	41.2	50.0+
Give me chance to exercise leadership	17.0	24.6	22.2	23.2
Provide me with adventure	9.4↓	32.2	29.9	29.3
Give me social status and prestige	9.4	11.6	12.4	2.4↓

1. Male students only; females similar except for 'security' to which they attach less importance.
2. Statistical comparisons (chi-squared, $P<0.05$): + attaches more importance than other fields; ↓ attaches less .

Pharmacy freshmen differed from all other groups in attaching low importance to being creative and original and to wanting to be free of supervision by others. They were also less inclined towards adventure. Like the scientists and engineers they attached more importance to security than did students of arts and social science, and they did not discount social status and prestige as did these students.

Given these general occupational orientations, is it possible to identify more specific influences channelling students' interests towards pharmacy? The reasons for changing to pharmacy as a prospective career already quoted provide some pointers. The authors have also had an opportunity of interviewing a sample of applicants to the School of Pharmacy.

This year 180 students who had applied for admission visited the School of Pharmacy at Bradford. While they were being shown round, a random sample of 50 was asked: (i) what had influenced them to choose pharmacy as a prospective career and (ii) had they seen any careers literature issued by the Pharmaceutical Society?

The responses are analysed in Table 2. The most important source of influence appeared to be direct experience of the occupation of pharmacy either through knowing a pharmacist (other than professionally) or having worked for a spell in a pharmacy. Forty-four per cent of the applicants gave one of these as the major influence on their career decision. Others had opted for pharmacy as an alternative to medicine, had been influenced by their teachers, or had lighted on the career unaware of any specific influences. Many applicants admitted that they had entered into 'A' level courses without any clear idea of what they would do next. Forty-two per cent of the applicants had seen the Society's recruiting literature, which might be thought a low figure given the 15,000 booklets issued.

Table 2: Influence3 on Applicants

Source of Influence	Per Cent (N=50)
Personal contact with pharmacist (relative or acquaintance made other than professionally)	28
Following period of part-time employment in a pharmacy	16
Teacher	14
Alternative to medicine	12
Other	6
Unaware of particular influence	24

Discussion

Students of pharmacy appear to differ from other students from science backgrounds in having a strong desire to work with people. They also seem to attach less importance to earning good money and to being creative and original. Although the financial returns of working in pharmacy can be high[7], this does not appear to have been a major motivation for those studied, or at least it wasn't something they were prepared to admit. Rather the opportunity of participating in social welfare appears to have been decisive.

It is widely recognised that the study of science may have particular appeal for those who are more interested in abstract patterns than the complexities of people (see Smithers[8] for a review). Science specialists in the sixth form came out as low on people-orientation on psychological measures. In a sense then pharmacy courses draw on an atypical population of sixth formers: those who have specialised in science, but who also want to work with people and be helpful to them. Some confirmation of this has been provided by Cooper and Foy[9] who showed pharmacy students tend to be significantly more extraverted than students generally.

The medical profession will also draw on this population of science sixth formers. The present study shows that many of the freshmen pharmacists had considered

medicine as a possible career and for some it would have been the preferred profession. The same is true in America (McCormack[10]).

With the present expanding need for doctors, technologists and scientists, it is doubtful if there will be much increase in the short term in the number of students with science 'A' levels presenting themselves for admission to Schools of Pharmacy. The data of the Dainton Report[3] make clear that, whereas there has been a trend against science in the sixth form which is likely to continue, concomitantly there has been a marked increase in the popularity of 'mixed 'A' levels'. Similarities in the occupational values of pharmacy students, and students of arts and social science, found in the present study suggest that sixth formers reading 'mixed 'A' levels' are likely to hold values which could be satisfied in the practice of pharmacy. Would it be possible or desirable to admit such students to pharmacy courses?

What would be the implications for pharmacy of taking as entrants those with good 'A' levels in say biology, geography and English literature? There would have to be adjustments to the courses to take account of the levels of previous knowledge that could be assumed, but this is not an intractable problem. Maths has been an acceptable alternative to biology for a number of years and pharmacology has thrived. According to Chilton[11], the essential parts of a general pharmacy course are applied pharmacology, dispensing and the law relating to pharmacy. Everything else is contestable and conceivably 'anything which keeps the students interested and intellectually stimulated would be of value'. This cannot be taken too far, but it does point to the potential for changing course content. The possibility of entry by a wider range of A-levels to general pharmacy courses deserves wide discussion and debate. Apart from anything else it could catalyse the re-appraisal of the curriculum which is long overdue.

Another factor predisposing students towards particular occupations is how much they know about them. The tendency of students to make late decisions for pharmacy may reflect a lack of knowledge of what pharmacy has to offer. In schools and elsewhere the shopkeeper role of the pharmacist is probably better known than his professional role. It is perhaps significant that among students who had made an early decision for pharmacy children of pharmacists were over-represented. Similar findings have been made in America[12]. Furthermore, of the applicants interviewed, about half mentioned knowing a pharmacist or having worked in a pharmacy as an important influence in their career decisions. This is also the American experience (Ohvall and Hammel[13]).

It seems likely, therefore, that increased knowledge among school children of the opportunities in pharmacy would attract a greater number of applicants. But the present careers literature alone does not appear to be adequate. Meeting this promotional need requires careful thought on the part of the Pharmaceutical Society and the Schools of Pharmacy.

Acknowledgement

The authors are grateful to Professor J.M. Rowson for his comments during preparation of the manuscript.

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Chapter 9: Personality Patterns and Levels of Dogmatism

According to Rokeach (1960) dogmatism is a defence against anxiety. He has reported highly significant correlations between dogmatism and anxiety in a number of groups, including American and British university students, and British workers. In two factor analytic studies, Fruchter, Rokeach and Novak (1958) found the two variables to be strongly loaded on the same factor.

Recent research has indicated that the situation may be more complex. Drakeford (1969) has examined interrelationships between dogmatism and the personality variables measured by the Eysenck Personality Inventory (Eysenck and Eysenck, 1964). As well as anticipating a relation between dogmatism and neuroticism, Drakeford (1969) argued that there was also reason to expect an association with extraversion. In the event, neither variable was found to be independently related to dogmatism, but there appeared to be an important interactional effect. Watson (1967) has also reported an interactional effect; but, whereas Drakeford (1969) found a high neuroticism-extravert group to be the most closed-minded, in Watson's study (1967) it was the high neuroticism-introvert group.

In view of the considerable theoretical implications of these findings, it seems important to establish how generalizable they are. Comparative data are available from a longitudinal study being conducted at the University of Bradford. All students entering the University in October 1966 were asked to complete a battery of questionnaires including Rokeach's dogmatism scale and the Eysenck Personality Inventory. Two years later in December 1968 the same students in the Boards of Engineering and Social Sciences (excluding Business Studies) were asked to complete the dogmatism questionnaire again. The present report concerns male students in those two Boards.

On the first occasion, under examination conditions, 224 students completed both instruments - 86 per cent of the intake. Two years later, when the questionnaires were mailed to the students, 89 or 46 per cent of the respondents in 1966 still remaining in the University completed the questionnaire again (29 students had withdrawn in the meantime). Comparison of the mean scores in 1966 of those students who responded again in 1968 and those who did not show some tendency for the more open-minded to be over-represented among the respondents - 155.0 ± 25.9 as against 159.8 ± 24.0 - but the difference is not significant ($t=1.11$, $P_{05}=1.96$). Dogmatism scores on entry did not vary with Board of Studies, but after two years students of engineering emerged as somewhat more open-minded than students of social science ($t=1.57$, $P_{05}=1.96$).

Following Furneaux (1962) four personality groups were established by dichotomising the N and E distributions at their medians: neurotic-extravert (N+E+), neurotic-introvert (N+E-), stable-extravert (N-E+) and stable-introvert (N-E-). Mean dogmatism scores for each of the groups in 1966 were calculated and compared by analysis of variance. The extent of change between 1966 and 1968 for each of the four groups was also analysed.

The data of Table l strongly suggest that while dogmatism is related to neuroticism it is independent of extraversion and interactional effects. Two-way analysis of variance of the groups randomly equalised to 40 shows the relationship with neuroticism to be significant beyond the 5 per cent level ($F=6.2$, where $f_1=1$, $f_2=156$). The product-moment correlation coefficient between dogmatism and neuroticism was calculated to be 0.20 ($N=224$, $P< 0.05$). This is rather lower than the coefficients between dogmatism and anxiety (measured by the M.M.P.I.) reported by Rokeach (1960) where for groups of comparable size r was found to be in the range 0.36 - 0.64.

Table 1: Dogmatism Scores

Personality Group	1966 N	1966 Mean	1966 SD	Change 1966-68 N	Change 1966-68 Mean	Change 1966-68 SD
N+E+	40	164.3	23.9	16	-5.9	12.3
N+E-	48	164.6	26.1	25	-7.6	23.1
N-E+	60	154.5	24.4	21	-12.5*	25.3
N-E-	40	154.7	25.3	17	-17.1*	24.3

* Change significant beyond 5 per cent level.

The relationship between dogmatism and neuroticism also emerged changes over time. While all four personality groups became somewhat more open-minded over the two years, only those for the low neuroticism groups were significant.

The results of the present inquiry support Rokeach's (1960) general hypothesis of a relationship between dogmatism and anxiety, but do not show the interactional effect reported by Drakeford (1969). Why there should be this discrepancy is not clear. Drakeford's (1969) freshman Canadian students with D scores in the range 79.4 - 102.7 were considerably more open-minded than the subjects of the present inquiry, or of Rokeach's (1960) studies. In Rokeach's (1960) seven studies of American and British students, scores in the range 141.5 - 152.8 were obtained. Lehmann (1963) and Lehmann, Sinha and Hartnett (1966) have also reported dogmatism scores for American students of this order (151.9 - 172.5).

Over two years all four personality groups became somewhat more open-minded in the university environment. This is in accord with the objectives of a university education. However, research by Lehmann, Sinha and Hartnett (1966) and Smithers (1969) suggests that students who withdraw from university after only one year and are followed up sometime later also change in the direction of open-mindedness. This may mean that the freshman year is particularly important or that the change is independent of the university environment. Little is known of the situational and psychological correlates of becoming more open-minded. The present inquiry suggests that low neuroticism may be a factor.

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Chapter 11: Some Characteristics of Business Students
Part A: Personality Patterns

Summary

Over ninety per cent of the 1966 intake of business students to the University of Bradford completed the Eysenck Personality Inventory on entry. Their mean level of neuroticism was higher than that of the general population, but similar to that of other university students at Bradford and elsewhere. The business students were less introvert than the student norm. Their mean neuroticism and extraversion scores were appreciably higher than those of successful businessmen. It may be that a different personality type is being attracted to business through the agency of the university business schools.

Introduction

The emergence of undergraduate courses in administrative and business studies has come about relatively recently in this country. Universities have always had as their function the passing on of skills important to society as well as the education of scholars, but this concern has been mainly confined to the learned professions. In general, business has been thought too much a matter of particular skills and techniques, and too little a body of fundamental knowledge to constitute the basis of an academic discipline. It has taken the recent rapid proliferation of subjects and subject-combinations catalysed by the post-Robbins expansion and development of the universities to sweep business studies into the university fold.

Since business courses are more directly vocational than many degree subjects, they can be expected to attract students with fairly precise vocational intentions. These students may be identifying themselves primarily with their future vocational roles. In terms of their values and personality characteristics they may have more in common with the practising businessman than with other university students.

Eysenck (1967) has recently reported on the personality characteristics of successful businessmen. He found (somewhat surprisingly in view of their popular image) that they tend to be introverted and extremely stable. University students also tend to be typically introverted (Cattell and Warburton, 1961), but rather less so than businessmen. The pronounced stability of the successful businessman stands in marked contrast to the high levels of neuroticism said to be characteristic of students (Eysenck and Eysenck, 1964; Child, 1969). If potential businessmen of the traditional kind are being attracted to the present undergraduate courses in business studies, then we would expect the business students to be more stable and more introvert than their peers.

We can examine this possibility for one entry of business students into a technological university. Over ninety per cent of one autumn intake of students (including business students) into the University of Bradford completed the Eysenck Personality Inventory (Eysenck and Eysenck, 1964) and questionnaires designed to reveal their educational and occupational values. In addition, information was obtained concerning the students' academic qualifications, geographical backgrounds and parental occupations. The data have been collected to establish a baseline for a

longitudinal study, but some are thought to be of sufficient immediate interest to merit separate presentation. In this paper the personality characteristics of business students will be considered. In a paper to be published later, attention will be focused on their educational and occupational values.

Sample

One undergraduate entry into the Bradford School of Administrative and Business Studies comprised 41 students, of whom 37 (31 males and 6 females) completed questionnaires. The male and female students were sufficiently alike in the characteristics considered in this paper to be treated as one group. Most of the respondents intended to specialise in one of the three principal options offered by the School: business studies, management science or accountancy.

Table 1 shows that compared to other students who entered the University of Bradford in the same year, the business students tended to come from a higher social class background and to be drawn from a wider geographical area. This contrasts with the American findings that business students are predominantly the children of blue-collar workers (Warner and Abegglen, l955; Pierson, l959). It is also apparent in Table 1 that business students were better qualified on entry than other Bradford students. This is again different from the American situation described by Gordon and Howell (1959) where they tend to be of lower ability than engineers and scientists.

Table 1: Comparisons of Business-Studies and Other Students

Category[1]	Business Students N=37	All Other Students[2] N=725	χ^2, df=1	P<
At least 2 'A' level passes in the same year equivalent to or better than CC	80.6%	54.3%	8.51	0.01
From Bradford and North	35.1%	54.1%	4.33	0.05
Parents non-manual workers	78.4%	58.2%	5.12	0.05

1. For an elaboration of these categories see Musgrove, F et al. (1967).
2 Includes 136 social science students, 282 engineering students, 215 science students and 92 pharmacy and optician students, but not 50 students who entered the University on an ONC qualification.

The 'A' level qualifications of the students suggests that many of them had made a firm decision to enter the world of commerce some time before entering university. Of the 37 students, 18 had 'A' level passes in economics or accountancy or both, and one student had passed the final examination of the Institute of Chartered Accountants. The comparative sureness of the students' career intentions is borne out by their responses to a question concerning their job preferences in the years before coming to university. Of the 55 who answered this question, 26 had had accountancy or the management side of industry in mind at least two years before entering university. Even allowing for retrospective reinterpretation the situation appears to be rather different from those reported in America where business studies tend to gain an unusual number of somewhat reluctant new recruits in the college years (Iffert, l957; Rosenberg, 1957).

Of the 31 students who entered the University through the Universities Central Council for Admissions, only three had given more than half their choices to technological universities, although nine had given their first choice to the University of Bradford. In spite of this low predisposition to come to a former CAT, on arrival 26 students were 'very pleased' or 'pleased' to be a Bradford student, five had 'mixed feelings', and none expressed disappointment.

Personality Characteristics

The mean neuroticism and extraversion scores of business-studies students are compared in Table 2 to the mean scores of all other Bradford students in the same intake, to the norms for student and normal populations given in the manual of the Eysenck Personality Inventory (Eysenck and Eysenck, 1964) and to the data on successful businessmen collected by Eysenck (1967).

Table 2: Neuroticism and Extraversion Scores[1]

Group	Number	Neuroticism		Extraversion	
		Mean	SD	Mean	SD
Business students	37	10.81	4.15	12.75	3.62
All other Bradford students[2]	570	9.67	4.33	11.63	4.21
Eysenck's norms for students	347	10.01	5.01	11.10*	4.54
General population	2,000	9.07*	4.78	12.07	4.37
Successful businessmen	1,504	7.27**	4.03	10.49**	3.88

1. Significant differences between business students and other groups (t-test): * beyond 0.05 per cent level, ** beyond 0.1 per cent level.
2. Autumn entry only.

On the neuroticism scale the business students returned a score which is significantly higher than that of the normal population ($t=2.55$, $P< 0.02$). In this they are like other Bradford students and Eysenck's students from whom they did not differ significantly. The mean neuroticism score of the business students is markedly higher than that of successful businessmen ($t=5.20$, $P< 0.001$).

The business students were also appreciably more extravert than the businessmen ($t=3.76$, $P< 0.001$) returning scores not significantly different from the normal population. In this they differed from other student groups which are reported to be typically less extravert than the normal population (Cattell and Warburton, 1961; Child, 1969). The difference in extraversion scores between business-studies and other Bradford students did not reach statistical significance ($t=1.80$, $P< 0.1$) but the business students were significantly more extravert ($t=2.57$, $P< 0.02$) than the student norm provided by Eysenck and Eysenck (1964).

Discussion

The American experience of students of low ability and low socio-economic status taking up business studies more or less by default is apparently not being repeated at Bradford. The intake studied were better qualified than many of their colleagues at the same technological university, came from a higher social class background (comparable to that of other university students as set out in Appendix II (B) of the 'Robbins Report', 1965) and were reasonably sure of their purpose.

Business students were similar to other students in their personality characteristics being, if anything, somewhat more extravert than the norm. This is in accord with the American findings of Gordon and Howell (1959). What is striking is the extent to which the neuroticism and extraversion scores of business students exceed those of successful businessmen. There have been few studies of change in personality characteristics with age and circumstances, but American research (Tate and Musick, 1954; Freedman, 1962) indicates that graduates become somewhat less neurotic and more extravert once established in their occupations. Business students in the present sample are already more extravert than the businessmen described by Eysenck (1967), and a substantial decline in student neuroticism would be required to match their stability. It may be that a different personality type is being attracted to business through the agency of the university business schools.

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Chapter 11: Some Characteristics of Business Students
Part B: Occupational Values

Summary

On entry to university, business students attached greatest importance to the extrinsic rewards of work such as good money and security, and also to opportunities for self-expression. After two years increased emphasis was placed on freedom from supervision and exercising leadership, and security diminished greatly in relative importance. Without knowing more about the occupational values of practising businessmen, and student perception of these values, it is not possible to say whether the changes that occurred are associated with the assumption of an occupational identity.

Introduction

Undergraduate courses in business studies are a recent invention in this country. In America, where they have been established for over fifty years, concern has been expressed at the low standard and narrow vocational character of many of them (Gordon and Howell, 1959; Pierson, 1959). They are held to admit too many students of low intellectual ability and to allow too many to graduate. The students are said to be poorly motivated. In an earlier paper (Smithers, 1968) it was reported that this experience is apparently not being repeated at a British technological university. There the business students are well-qualified, reasonably sure of their purpose and come from a social class background comparable to that of other university students. They also resemble other university students (but differ from successful businessmen) in their personality characteristics, being only a little less introvert than the student norm. Similar to other students in many ways, business students can however be expected to differ in their occupational orientation.

It has been found convenient to conceptualise occupational choice as a process of compromise between aspirations and expectations. It is seen as a function of (an individual's) values and his perception of the chances of realising them in alternative occupations' (Ford and Box, 1967). The process is not conceived in simple developmental terms, but rather as a series of inter-related choice periods in which decisions limit or extend the range of future choices (Blau et al., 1956). One such intermediate stage is the choice of specialism at university. Where this is vocationally oriented the range of future choices will be narrowed, Decisions to take such courses are likely to be made with some reference to occupational values. Recent research by Carruthers (1968) has shown important differences between the occupational values of students grouped by subject area. Students on management courses attached more importance than others to organising and directing the activities of people, and less to having pleasant work colleagues, varied work and to helping others. When grouped by subsequent job choices, businessmen similarly gave low weight to altruism, but considered variety and pleasant associates relatively important. Unlike the management students, the businessmen considered the economic returns of work more important than intellectual stimulation and attached low importance to the opportunity to be creative. American research (e.g. Rosenberg, 1957; Simpson and Simpson, 1960) has shown that prospective businessmen tended to be mainly interested in the

returns of work such as good money and status and prestige, and comparatively little interested in work for its own sake.

There have been few studies of change in occupational values in relation to particular patterns of experiences. Rosenberg (1957) has shown that when occupational values are consistent with occupational choices little change occurs over two years in college, but when values and choices are not in accord both tend to change in the direction of mutual consistency. Vocational interests, which relate to occupational values, tend to be very stable (Strong, 1955), but those of business managers have been found to become more distinctive with time.

American research (e.g. Goldsen et al., 1960) indicates that the occupational values of male and female students differ appreciably. A study by the present author to be published soon suggests that this is not necessarily the case for all groups of students. Male and female students of arts and social science, pharmacy and optics tended to hold the same occupational values except that female students looked less for security in work. Nevertheless in the present study attention is confined to the male students.

The study reported below compares the occupational values of first year business students with their contemporaries in a technological university and also describes changes which occurred during the first two years of the university courses.

Methods of Enquiry

As part of a longitudinal study of the career orientations of students entering a technological university, a questionnaire designed to reveal their occupational values was sent to one entire intake of students. Following Rosenberg (1957), subjects were asked to indicate the extent to which a job or career would have to satisfy each of ten requirements (these are listed in Table 2) before it could be considered ideal. After two years the students were again asked to complete the questionnaire. In the first version of the instrument a three-point scale was used, but subsequently two further categories were added in order to make it possible to factor analyse the results. This analysis is to be reported elsewhere (Smithers, 1969a).

In the tables presented below the values of business students are compared with those of other student groups. These are based on the four Boards of Studies of the University of Bradford. The School of Administrative and Business Studies has been separated from the Board of Social Sciences, the rest of which (students of social science, applied social studies and modern languages) is treated as a group. The Board of Engineering (comprising the Schools of Chemical, Civil, Electrical and Mechanical Engineering) is taken as a group, but the two schools comprising the Board of Life Sciences were found to have diverging values. Students of pharmacy have therefore been grouped with students of optics with whom they have much in common. Students of applied biology have been joined with the remainder of the Board of Physical Sciences (chemists, physicists, materials scientists, mathematicians and textile technologists) to comprise the ‘Applied Scientists’.

Over ninety-three per cent of the intake completed the occupational-values questionnaire on first administration. When it was presented again after two years over three-quarters of the students who completed the questionnaire on the first

occasion did so again (the range was 74.1 per cent for students of engineering to 88.9 per cent for students of arts and social science). (In calculating this second response rate: (i) students who withdrew from the courses in the meantime and (ii) students of physics and half the intake of the Schools of Chemical, Electrical and Mechanical Engineering who were away in industry at the time of testing, were excluded).

Results

The characteristics of the sample of business students were described in an earlier paper (Smithers, 1968). After two years, five of the original sample of thirty-seven students had withdrawn (mainly through examination failure) and two others had transferred to other courses within the university. Table l shows that there was little difference in the neuroticism scores of those who dropped out and those who remained, but the students who withdrew tended to be among the more extravert.

Table 1: Personality Patterns of Business Students

Progress	N	Neuroticism[1]		Extraversion[1]	
		Mean Score	SD	Mean Score	SD
Continuing[2]	(N=30)	10.77	3.87	12.43	3.38
Dropouts	(N=7)	11.00	4.99	14.14	4.02
	t	0.13		1.13	

1. Measured by Eysenck Personality Inventory.
2. Successfully completed two years.

It is apparent from Table 2 that the occupational values of male business students in their first year at university often resemble those of other male students in a technological university, but differ from them in some important respects.

In common with most other Bradford students, the business students attached greatest importance to ‘an opportunity to use my special abilities’. They also attached considerable importance to a stable, secure future and rather less to the opportunity to be creative and original. Like all other groups of students they attached least importance to social status and prestige. However, significantly more business students than others considered this to be an important job characteristic. The differences from students of social science (χ^2=15.29, P< 0.001), engineering (χ^2=10.02, P< 0.01) and applied science (χ^2=8.27, P< 0.01) are all very significant and the difference from students of pharmacy and optics (χ^2=5.14) is significant at the five per cent level. In addition, business students were more concerned than other students with the chance to earn good money, the differences from students of social science (χ^2=9.77, P< 0.01) and pharmacy and optics (χ^2=3.87, P< 0.05) being significant.

Like students of social science, pharmacy and optics, business students attached more importance to working ‘with people rather than things’ than did students of engineering (χ^2=10.06, P< 0.01) or applied science (χ^2=8.28, P< 0.01). But in common with the engineers and applied scientists, they were not very concerned for an opportunity to be helpful to others. In this they differed significantly from students of social science (χ^2=4.61, P< 0.05) and pharmacy and optics (χ^2=17.05, P< 0.001). The business students apparently want to work with people but not be helpful to them.

Table 2: Occupational Values of Male First Year Students[1,2]

The ideal job would:	Business Studies (N=31)	Arts & Soc Sci (N=82)	Pharmacy & Optics (N=66)	Engineering (N=276)	Applied Science (N=194)
Provide me with adventure	25.8	29.3	13.6	32.2	29.9
Provide me with a chance to earn good money	67.7	32.9**	43.9*	64.9	60.8
Provide an opportunity to use my special abilities	71.0	81.7	69.7	75.4	78.4
Give me an opportunity to work with people rather than things	48.4	59.8	50.0	21.0**	22.2**
Enable me to look forward to a stable secure future	64.5	51.2	74.2	74.6	76.8
Give me a chance to exercise leadership	38.7	23.2	16.7*	24.6	22.2
Give me social status and prestige++	19.4	2.4***	7.6*	11.6**	12.4**
Give me an opportunity to be helpful to others	19.4	41.5*	66.7***	26.1	35.1
Permit me to be creative and original	45.2	48.8	25.8	54.7	55.7
Leave me relatively free of supervision by others	48.4	50.0	30.3	43.8	41.2

1. Comparison for all variables except status based on 'high importance' vs. other ratings; but for 'status', given the low ratings on this variable it is based on others versus 'of no importance'.

2. Significant beyond 5% level *; 1% level **; 0.1% level ***.

Business students attached more importance than the other groups to the chance to exercise leadership, the difference from the students of pharmacy and optics (χ^2=4.51, P< 0.05) being significant. All groups thought that to be left relatively free of supervision was an important job characteristic.

Table 3 shows the relative importance of the various occupational values, initially and after two years. There were few changes in emphasis amongst the students of applied science and engineering during this time, but there was much more re-orientation on the part of the business students. Whereas Spearman's Rho for the applied scientists was 0.99 and for the engineers 0.90, for the business students it was only 0.59. This approximates to t=2.1 which falls short of significance at the five per cent level (P_{05}=2.31, df=8). In all other cases the first and second rankings were correlated significantly beyond the one per cent level.

The most dramatic change amongst the business students concerned the desire for a stable, secure future. Initially ranked third, it was ranked ninth after two years. A similar trend is discernible amongst the social scientists, but students of pharmacy and optics, applied science and engineering continued to regard security as a highly important work value. Emphasis on freedom from supervision tended to increase amongst students of social science and optics after two years, but amongst business students it came to be ranked as the most important job characteristic along with good money.

Table 3: Ranking[1] of Values by Male Students: Initially: (A) and after Two Years (B)

Value Variable	Business Studies (N=21)		Arts & Social Science (N=71)		Pharmacy & Optics (N=45)		Engineering (N=107)		Applied Science (N=112)	
	A	B	A	B	A	B	A	B	A	B
Adventure	9	7=	9	9	10	10	6	7	8	8
Good money	1=	1=	7	5	5=	4	3	2	3	2
Special abilities	1=	4	1	1	1	1	2	1	1	1
People	5	6	3	2	4	6	9	8	8	8
Security	3	9	4	7	2	2	1	3	2	3
Leadership	6	3	8	8	8	8	8	6	7	7
Status	8=	7=	10	10	9	9	10	10	10	10
Helpful	8=	10	2	6	3	5	7	9	5	5
Creative	7	5	5=	4	7	7	4	4	4	4
Supervision	4	1=	5=	3	5=	2	5	5	6	6
Spearman's Rho	0.59		0.77		0.86		0.90		0.99	

1. Ranks derived from sum of assigned scores.

Business students also attached more importance to the chance to exercise leadership after two years, a work value on which the other groups of students did not place much emphasis. An opportunity to use my special abilities' continued to be ranked as the most important characteristic by most groups of students; but with the increasing concern of the business students for freedom from supervision and the chance to exercise leadership, use of special abilities was relegated to fourth position after two years. During that time business students attached increasing relative importance to the chance to be creative and original

Discussion

The present finding that first year business students are more likely to be motivated by the extrinsic rewards of work than are students in other fields of study supports much American research. Pierson (1959) reported that more 'business majors' than 'all other majors' were attracted to their occupation because they 'thought it offered opportunity or reward'. In Rosenberg's (1957) nationwide survey of college students 'people planning to enter business place the greatest stress on the extrinsic rewards of money, status and security'. 'Prospective businessmen tended to be interested in money and leisure, and uninterested in work itself or occupational colleagues as a group' (Simpson and Simpson, 1960). Similar results have been obtained using the Allport-Vernon-Lindzey Study of Values. In summarising the numerous studies that have been conducted using this instrument, Super and Crites (1962) note that 'business students are the only group characterised by economic values'. Recently in this country Carruthers (1968) has found that businessmen ranked the economic returns of work highest of the fifteen variables of Super's Work Values Inventory.

The relative weight given by business students to working with people and being helpful to them is interesting. Rosenberg (1957) in his study of 4,585 American college students found that these two value variables tended to form part of the same value-complex. To a large extent this is supported by the present study. Both values

tended to be important to students of social science and pharmacy and optics, but not to engineers. But the business students differentiated between them, attaching more importance to working with people than being helpful to them. This is supported by the finding of Carruthers (1968) that both postgraduate management students and businessmen scored very low on 'altruism'.

Similar results have also been obtained using other instruments. The Kuder Preference Record and the Connelly Occupational Interests Questionnaire distinguish between the social (meeting and dealing with people in order to help them in some way) and persuasive (getting people to work towards the goals you set) areas of occupational interest. Recent research in England by Brown (1968) with the Connelly Occupational Interests Questionnaire has shown that the distinctive feature of the occupational profiles of management trainees and sales trainees was the considerable importance which they attached to 'people persuasive' interests. Factor analysis of responses to the Strong Vocational Interests Blank consistently isolates a factor which Strong himself hesitated to name. It has been called a business contact interest by Super (1957): this interest may be characterised as 'interested in dealing with people for the good they can do oneself or one's organisation rather than for their own good'.

In considering their future careers, freshmen business students in the present sample looked forward to a chance to use their special abilities, to good money and security. They showed more inclination towards leadership and more concern with status and prestige than did their peers.

The high ambitions of business students have also been described by Musgrove (1967). He found that given a scale on which they were required to indicate the occupational level which they hoped to have reached at 55 and at the peaks of their careers, they revealed higher aspirations than other students. Moreover, Musgrove also found that business students were more likely to expect to get the kind of job they ideally wanted than were other students: "Only a quarter of the business students thought they were likely to do something different from their ideal (compared to) fifty per cent of the engineers, scientists and social scientists."

After two years of their degree courses, the Bradford business students continued to value highly good money and use of special abilities, but freedom from supervision and chance to exercise leadership gained in emphasis, while security came to be almost as unimportant as helping people. This suggests that during two years in university the students were developing a certain daring and willingness to take risks. Most groups of Bradford students continued to support or discount both 'good money' and 'security'. Rosenberg (1957) has also found that these two values tend to go together: 'the conflict of the college man does not seem to be a question of money versus security; rather, it appears likely that many people want money in order to have security'. But apparently not these prospective businessmen!

Re-orientation of occupational values amongst the business students studied stands in marked contrast to the stability of the values of the engineers and applied scientists. Smithers (1969b) has described the occupational values of engineering students on sandwich courses and has shown them to be little affected by either industrial

experience or intramural studies. In Strong's (1955) follow-up study of vocational interests after 18 years it was the business managers who had changed the most.

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Chapter 15: Success and Failure among Social Scientists & Health Scientists

Summary

One hundred and eighty-six students, 93 per cent of one intake of social and health scientists into the University of Bradford, were classified according to degree result and compared on a number of measures. Performance was found to be positively related to A-level results and inversely to social class background. Introversion and open-mindedness appeared to be an advantage in the social sciences, neuroticism in the health sciences. In both fields, the successful tended to score higher on the Nufferno intelligence test. Success in the professionally oriented health sciences was related to strength of occupational motivation. Successful and unsuccessful students differed only slightly in the importance attached to academic goals. They did not differ in reported worries.

Introduction

There have been many studies of the correlates of academic success. At the university level, no clear-cut picture has yet emerged, but it is possible to make out some points of detail. It seems generally agreed that people who do well in examinations at school also tend to do well in examinations at university (Austwick, 1960; Hawkins, 1967; Pilkington and Harrison, 1967; the 'Dainton Report', 1968; Maclay, 1968). But the level of correlation tends to be quite low (Drever, 1965) and to vary with subject (Kelsall, 1963). The extent of the association becomes less with the length of time intervening between the respective examinations (Humphries, 1968; Bagg, 1968).

In general terms, success in examinations, as in many other things, may be said to depend on capacity and inclination (Rodger, 1965). Where a wide ability range has been tested as with American College students (Lavin, 1965) or in the 11+ examination (Vernon, 1965), measured intelligence appears to correlate quite highly with scholastic success. But among the relatively homogenous population of British university students, intelligence tests, even high level tests like the A.H. 5 and the Valentine, have low predictive power (Pilkington and Harrison, 1967).

A number of non-intellectual personality characteristics have been studied in relation to examination success. At the university level, introversion appears to be a favoured trait: introverts, it seems, have a better chance of being accepted (Cattell and Warburton, 1961; Child, 1969) do better in examinations (Bendig, 1960; Furneaux, 1962; Kelvin, Lucas and Ojha, 1965) and are under-represented among dropouts (Wankowski, 1968). The situation with regard to neuroticism is less clear. There are indications that high neuroticism may interact with introversion in examination success (Furneaux, 1962; Kelvin *et al,* 1965), but according to Wankowski (1968), it is the stable introverts who do best. None of these relationships appear to hold at the school level (Entwistle and Cunningham, 1968).

Another personality characteristic which may be of importance is dogmatism as defined by Rokeach (1960). Among Canadian school leavers (Linton, 1968) and American students, particularly social scientists (Ehrlich, 1961; White and Alter, 196?), dogmatism has generally been found to correlate negatively with examination

performance. But some variation with course content has been reported (Costin, 1965).

Failure at university has been shown to be related to lack of academic motivation (Hopkins, Malleson and Sarnoff, 1958; Maclay, 1968; Wankowski, 1968) and, particularly where professional training is involved, to lack of occupational motivation (Summerskill, 1962). Cohen and Child (1969) in a study of withdrawals from the University of Bradford have found that those from applied science and engineering tended to differ from non-dropouts in being both less inclined to enter a technological university and less satisfied with their career prospects. Dropouts also seemed to find the university environment more worrying.

In addition to capacity and inclination, application is likely to be important. In a study of changing educational values at Bradford, Musgrove (1969) has been able to trace a process of convergence on central academic objectives and de-emphasis of activities not directly rewarded in the examination system. The extent of this academic focussing may distinguish the successful and unsuccessful. Both Malleson (1960) and Maclay (1968) have found that students who do well in examinations tend to stand apart from university social life.

Educational attainment has often been discussed in relation to social class background. It is well established that the early school years children from non-manual homes are at an advantage, but according to Furneaux (1961) this is no longer true by the time the sixth-form stage is reached. The 'Robbins Report', which like the Furneaux investigation surveyed a range of universities, indicates a negligible association between performance and social class; and neither Himelweit and Summerfield (1951) at L.S.E. nor Maclay (1968) at Birmingham could detect a connection, But Dale (1965) has suggested that the proportions from the different classes in a particular institution may be important. Drawing on findings from Cambridge, Oxford and University College, London, he has hypothesized that where it is hard for a student from a working class background to obtain a place there will be an inverse relationship between social class and performance. In a situation where there is less competition for places, Cohen and Child (1969) found students from manual backgrounds to be over-represented among science and technology dropouts.

At the University of Bradford a longitudinal study was initiated in 1966 among the entering students. In l969, the first of these students - students in the fields of social sciences and health sciences - graduated. From the measures taken, both on entry and at other times, it is possible to examine a number of factors likely to be relevant to success in these fields. This paper compares (i) students who were awarded a good degree, (ii) students who also graduated, and (m) those who have not yet obtained a degree.

Methods

Over 93 per cent of students entering the Schools of Social Sciences, Business Studies, Pharmacy and Optics of the University of Bradford in October 1966 provided information about themselves and completed a battery of tests and questionnaires under examination conditions. The Registry also made available copies of the

students' U.C.C.A. application forms. On other occasions during their university careers, these students completed further questionnaires and some of the original ones again.

For the purposes of the present analysis, students from the two schools of the Board of Social Sciences have been designated 'social scientists' and students from the Schools of Pharmacy and Optics as 'health scientists'. The distribution of subjects according to degree results is presented in Table 1. Firsts and upper seconds have been classified as 'good degrees'; lower seconds, thirds and passes as 'other degrees' and failure to graduate as 'no degree'. This last category includes students who withdrew from the university; those who are repeating parts of their courses and those who failed finals. No distinction has been drawn between special honours and general honours courses in pharmacy; the course taken appears to depend as much on career preference as early examination performance. The data of Table 1 show that degree class was largely independent of sex and field of study.

The variables comprising the longitudinal study include a number which may have a bearing on examination success. The social class background and A-level results of the students were obtained from the U.C.C.A. application forms and classified according to established criteria (see Tables 2 and 3). Aspects of personality were measured by the Eysenck Personality Inventory (Eysenck and Eysenck, 1964), the Nufferno Level Test (Furneaux, 1956) and Rokeach's (1960) dogmatism scale.

Table 1: Distribution of Sample

Field of Study	Good Degree	Other Degree	No Degree
Social Sciences			
Male	23	45	15
Female	2	6	3
Health Sciences			
Male	10	42	15
Female	5	18	2
All	**40**	**111**	**35**

Various measures of motivation were taken. A student's inclination to attend a technological university was estimated from the proportion of his U.C.C.A. choices given to the ex-CATs, a half or more being taken as a high CAT-bias. It was also possible to identify students who had not originally applied to Bradford, but had obtained a place through the Clearing Scheme.

Levels of aspiration were measured in the manner devised by Musgrove (1967). Students were given a vertical scale marked off at nine occupational levels and asked to indicate the point they hoped to have reached (i) by the age of 35 and (ii) at the peaks of their careers. Students were also asked to indicate their degree of satisfaction with their present work expectations by ticking one of five statements ranging from 'very satisfied; this is the work I really want to do and see myself in' to 'very unsatisfied; shall eventually seek a change'. Satisfaction with occupational choice was also measured by asking students to indicate (i) the type of work they would ideally like and (ii) the field which, in all likelihood, they would enter. Research-degree

orientation was estimated by asking students to tick one of five statements ranging from 'I have a very strong desire to stay on at a university for a research degree' to 'I am quite sure that I should not wish to stay on for a research degree'.

Students' educational values were ascertained by asking them to rate on a five point scale 25 possible characteristics of the ideal university (Musgrove, 1968a).

All the above measures were taken on entry to the university. At the end of the first term students completed a problem checklist compiled by Musgrove (1968b). In June 1968, two academic years after entering the University, some of the questionnaires were administered again including the occupational motivation instruments, the educational values questionnaire and the problem checklist.

Results

Degree result was found to be inversely related to social class background. The data of Table 2 show that among social science students there was a significant tendency for those from working class backgrounds to be over-represented among those obtaining good degrees and under-represented among the failures. A similar trend was discernible among health science students, but the result does not quite reach the 5 per cent level of significance. In both fields of study about twice as many students from non-manual as from manual backgrounds were admitted.

Table 2: Degree Outcome by Social Class

Social Class[1]	Degree Outcomes				
	Good	Other	None	χ^2	P (df=2)
Social Scientists					
Non Manual (N=66)	21.2	54.5	24.2	6.36	0.05
Manual (N=26)	38.4	57.8	3.8		
Health Scientists					
Non Manual (N=62)	12.9	62.9	24.2	4.87	0.1
Manual (N=30)	28.3	70.0	6.7		

1. Registrar's Social Categories: non-manual, classes I-III(a) and manual, classes III(b)-V.

The data of Table 3 show that successful students tended to have better A-level results than unsuccessful students, but the difference is not appreciable. Although the tendency is evident in both fields of study, in neither case does it reach an acceptable level of significance. When, however, the two sets of results are combined, the difference is significant beyond the 2.5 per cent level.

Certain aspects of personality were found to be linked to success, and these varied with field of study. The data of Table 4 show that introversion was significantly related to higher performance in the social sciences, but not in the health sciences. (There is some suggestion that people who failed to get a degree in the health sciences were more extravert than their more successful colleagues, but the difference is not significant). Conversely, no connection was observed between neuroticism and success in the social sciences, but there was some indication of a positive relationship

in the health sciences (for 'good degree' against 'other degree' t=1.55, P< 0.15; for 'good degree' against 'no degree', t=1.60, P< 0.15).

Table 3: Degree Outcome by Entry Qualification

Qualification[1]	Degree Outcomes %Good	%Other	%None	χ^2
Social Sciences				
Good (N=34)	35.3	53.0	11.8	3.07
Not Good (N=57)	21.1	56.1	22.8	
Health Sciences				
Good (N=18)	27.8	66.7	5.5	3.84
Not Good (N=74)	13.5	64.9	21.6	

1. Based on UCCA categories: 'good A-levels': any combination of 5 A-level passes equivalent to or better than CCC or 2 A-level passes, AB.

Table 4: Degree Outcome by Personality[1]

Characteristic	Good Degree Mean.	SD	Other Degree Mean.	SD	No Degree Mean.	SD
Extraversion						
Social Sciences	10.17*	3.47	12.21	4.41	13.69	3.70
Health Sciences	11.53	3.42	11.61	3.96	12.44	3.62
Neuroticism						
Social Sciences	10.12	3.60	10.75	5.31	10.19	5.40
Health Sciences	10.87	4.67	8.80	4.22	8.19	4.68
Intelligence (Nufferno)						
Social Sciences	249.7	65.4	230.5	65.0	230.4	73.1
Health Sciences	286.1	51.4	257.5	70.7	261.7	52.1
Open-mindedness						
Social Sciences	167.8+	18.6	161.8	24.5	156.2	43.2
Health Sciences	161.2	32.4	164.7	31.4	166.5	21.5

1. Significance indicated by: * 'good degree' different from 'other degree' (t=2.14, P< 0.05) and 'no degree' (t=3.70, P<0.01), and + significantly different from 'other degree' (t=2.60, P< 0.02).

Performance in the health sciences was found to be independent of the level of dogmatism, but in the social sciences, open-mindedness was positively related to success. The high standard deviation of the scores of failures in the social sciences suggests that both the pronouncedly open-minded and closed-minded were at risk.

In both social sciences and health sciences there appears to be an obvious trend for those who scored well on the Nufferno intelligence test to obtain the better degrees, but the differences are not significant. When the mean of all those who obtained good degrees is compared to the mean score of the rest, t=1.78 (P< 0.1). Health scientists generally obtained higher Nufferno scores than social scientists.

The extent of enthusiasm to attend a technological university was not related to the class of degree eventually obtained. Neither did inclination to study at a College of Advanced Technology. But there is some indication that those who obtained admission through the Clearing Scheme tended to do less well than those who applied

to Bradford in the first place. Of the Clearing Scheme entrants only 13.2 per cent obtained good degrees and 27.0 per cent were among the failures compared to 24.5 per cent and 15.4 per cent of the other students respectively (χ^2=4.78, df=2, P< 0.1).

Occupational motivation appeared to be related to degree performance in some but not all fields. The data of Table 5 show a link between satisfaction with career prospects and degree result among health scientists, but not for social scientists.

Table 5: Degree Outcome by Satisfaction with Career Prospects on Entry

Satisfaction	Degree Outcomes				
	%Good	%Other	%None	χ^2 (df=2)	P
Social Sciences					
Very Satisfied (N=43)	27.9	53.5	18.6	0.02	ns
Less than very satisfied (N=25)	28.0	52.0	20.0		
Health Sciences					
Very Satisfied (N=54)	22.2	64.9	13.0	9.68	0.01
Less than very satisfied (N=29)	0.0	69.0	31.0		

This is supported by the extent of correspondence between ideal and probable occupational choices. Table 6 shows that again it appears to matter for students in the health sciences, but not in the social sciences.

Table 6: Ideal and Probable Occupational Choices on Entry

Occupation Choices	Degree Outcomes				
	%Good	%Other	%None	χ^2 (df= 2)	P
Social Sciences					
Concordant (N=56)	25.0	55.3	19.6	0.45	ns
Discrepant (N=34)	29.4	56.0	14.7		
Health Sciences					
Concordant (N=44)	25.0	61.4	13.6	5.85	0.1
Discrepant (N=44)	6.8	70.5	22.7		

The extent of convergence on academic aspects of a university education appears to be only slightly related to degree success. Of the six indicators listed by Musgrove (1969), only the importance attached to 'good community spirit' differentiated the successful and less successful. Significantly more of the former attached less importance to this item after two years in the university (χ^2=5.33 df=1, P< 0.025). In addition, the successful tended to attach relatively more importance after two years to the presence of 'distinguished scientists and scholars who are well known for their research' (χ^2=3.49, df=1, P< 0.1).

The successful and less successful did not differ in their desire to pursue postgraduate work for a research degree, either on entry or after two years. Those who failed to obtain a degree did not report any more problems than those who obtained a degree; neither was class of degree important in this respect.

Table 7: Levels of Aspiration for Age 35

Levels of Aspiration	Degree Outcome				
	Good	Other	None	χ^2 (df=2)	P<
On Entry (1966)					
Social Sciences					
High* (N=56)	28.6	55.3	16.1	0.16	ns
Low (N=32)	25.0	59.4	15.6		
Health Sciences					
High* (N=50)	24.0	56.0	20.0	7.09	0.05
Low (N=37)	5.4	81.1	13.5		
Change (1966-68)					
Social Sciences					
Higher (N=32)	33.3	68.4	-		
Lower (N=12)	33.3	15.8	-	6.14	0.05
Same (N=12)	33.3	15.8	-		
Health Sciences					
Higher (N=31)	58.3	51.1	-		
Lower (N=11)	25.0	17.0	-	1.19	ns
Same (N=17)	16.7	31.9	-		

* Levels 5-9.

Discussion

The present inquiry indicates that academically successful students differ from the less successful in ways other than just the ability to do well in examinations. Among social scientists and health scientists at the University of Bradford differences were found in social class background, aspects of personality and, in the case of the professionally oriented health science courses, differences in occupational motivation.

In the sample studied, the students who did well tended to be better qualified on entry and more intelligent according to the Nufferno test. The first observation accords with much previous research; the second probably reflects the relatively wide ability range entering a technological university. The tendency of social scientists to do less well on the Nufferno test than students from natural science backgrounds has been discussed by Child (1969).

Successful and unsuccessful students appear to differ in personality characteristics, the differences varying with field of study. Introversion among social scientists and neuroticism among the generally more stable health scientists appeared to be favoured traits. Also among social scientists, but not health scientists, open-mindedness appeared to correlate with success. According to Rokeach (1960), the crucial difference between the open- and closed-minded in the inability of the latter to synthesize new cognitive systems. It is possible that the social sciences with their conceptual emphasis are more demanding of this ability than the health sciences.

In the health sciences, where there is a relatively clear-cut relation between courses and career opportunities, the occupational motivation of the students assumes importance. Successful students in this field tended to enter university with higher

levels of aspiration, to be generally very satisfied with their career prospects, and to be confident of getting the jobs they ideally wanted. In the social sciences there were no such differences at the outset, but during two years the less successful tended to develop higher levels of aspiration (perhaps by way of compensation).

The present inquiry differs from a number of other studies in finding a relationship between social class background and academic success at university. In both fields of study, in terms of both outright failure and degree class, students from working class backgrounds tended to be the more successful. This contrasts with the finding of Cohen and Child (1959) that among the 1966 intake of applied scientists and technologists into the University of Bradford, students from manual backgrounds were over-represented among the dropouts. The social science and health science schools resemble each other, but differ from the applied science and technology schools, in accepting a high proportion of students from non-manual backgrounds. Taken together these observations lend support to Dale's (1965) hypothesis that where the bias against a working class student is relatively high, achievement will be inversely related to social class background.

Successful and unsuccessful students did not appear to differ in their ease of adjustment to the university environment. Neither did they differ much in the relative importance which they attached to academic activities. This may mean that focussing on academic work is not strongly related to examination success. Other British studies have generally failed to detect a relationship between study habits (including length of time spent studying) and examination success, although some connection has been reported in America (Cooper and Foy, 1969).

The subjects of the present inquiry were on three-year courses. Next year, in 1970, their colleagues in applied science and engineering on four-year sandwich courses will be graduating. A second paper will report on correlates of success among these students.

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Chapter 18: Industrial Experience in a University Curriculum

Summary

Thin-sandwich students indicated their attitudes to industrial training on entry to the university, after their first industrial experience, and again after the second. Attitudes on entry were predominantly favourable and remained generally well-disposed after periods in industry. Some deterioration occurred on items in the attitude scale which referred to intellectual development and the relationship between theory and practice. Favourable attitudes were maintained or still further improved on items on social learning and organizational skills. Thick-sandwich course students also reported their attitudes on entry and again after two years in the university. Generally favourable attitudes were largely sustained, although on the second administration of the test there were indications that industrial experience might be regarded as an interruption of academic study.

Introduction

Periods spent in industry may be of value to undergraduates in a variety of ways: students may learn about industrial organizations and their problems from first-hand experience and direct involvement; their understanding of science and technology may be deepened and widened from seeing theory put into practice; and they may develop confidence and skills in interpersonal relationships as they learn to cope with the human problems of working in an industrial environment.

Surveys of student opinion in the former Colleges of Advanced Technology indicated that in general students saw considerable value in the sandwich course. Marris found that students at Northampton College of Advanced Technology appreciated industrial experience as much for the opportunities for social learning, as for the scientific and technological, learning: "though (the course) was designed more to integrate theory and practice, its value seems to lie as much in the general involvement of a student in society."[1] He also put it this way: "It is the experience of industrial relationships which has the widest relevance, but also seems most difficult to rationalize... But indirectly it meets the needs of all students, irrespective of their subject, to overcome their isolation from society at large, and test the validity of their education in its ultimate setting."[2]

Jahoda asked 139 students at Brunel to rate their experiences after their first period (six months) in industry. Forty-one per cent said the experience was 'good', 42.5 per cent that it was 'mixed', and 16.5 per cent that it was 'bad', Sixty-two students (44.7 per cent) said that there was 'very little relation' between their industrial work and their college studies, 77 (55.3 per cent) said that there was 'some relation'. There was a tendency for those who saw 'some relation' to rate their industrial period more favourably.[3] Heward's study of a sample of 129 final year Diploma of Technology students showed similar levels of satisfaction with industrial training: 45 per cent were 'satisfied', 50 per cent were 'not satisfied' (and five per cent made no response). There was a tendency for the dissatisfied students to regard their course as "too theoretical".[4]

There is evidence that students who enter a technological university are predisposed to place high value on studies which are "concerned with the relevance of learning to

the real world" and which involve "practical training in industry or other organizations".[5] Little attempt has been made to conduct studies of change in students' evaluations of the curriculum; although one study has related changing attitudes to the bureaucratic features of the industrial organizations in which students were placed.[6] A comparison of problems which students experience in university and industrial environments has indicated that problems of personal relationship may be less frequent in industry.[7]

The inquiry reported below is a contribution to evaluation studies in this area. It describes the attitudes to industrial training among students as they enter a technological university, and among the same students after their first industrial experience, and again after their second. It also reports changes in attitude which occur in thick-sandwich-course students during their two years in the university before moving on to their year of industrial training.

Methods

The study was of engineering and science students at the University of Bradford over a two-year period (1966-68). The instrument used was a Likert scale of attitude to industrial training.

Statements for the scale were obtained from interviews with twelve students who were undergoing industrial training and with twenty-four randomly selected students who had recently returned from periods in industry. These students were asked what they found valuable in their industrial training periods, what they found of little or no value, what they liked, and what they disliked.

Forty statements were taken from these students' verbal responses and presented to ninety-three senior students for agreement-disagreement on a five-point scale. The split-half reliability coefficient was 0.86. (Thirty-three students completed the questionnaire two weeks later: the test-retest reliability coefficient was 0.87.) After item-analysis, ten statements which failed to discriminate between high scorers and low scorers were discarded.

The scale was recast in a prospective form. Thus a statement in the retrospective version which read: 'Much of what I had learned in theory became more real and had more meaning when I saw it in practice in industry' was recast as: 'I expect that much of what I have learned in theory will become more real and have more meaning when I see it in practice in industry'. In its prospective form the questionnaire was completed by all students entering the University in October 1966. A split-half reliability coefficient of 0.86 was obtained using the scores of a twenty-five per cent stratified random sample (N=122).

Subjects rated each of the 50 items on the scale 1 (strongly agree), 2 (agree), 3 (uncertain), 4 (disagree), or 5 (strongly disagree). The range of scores was therefore 30-150, the higher the score the more unfavourable the attitude. In the presentation of subjects' scores the scale is arbitrarily divided into five bands: scores within the range 30-54 are considered 'very favourable', 55-78 'favourable', 79-112 'uncertain', 113-136 'unfavourable', and 137-150 'very unfavourable'.

Scores on the prospective version of the attitude scale were obtained from students of chemical, mechanical and electrical engineering when they joined the University in the autumn of 1966. These students went into industry for six months immediately after they had registered at the University. When they returned in February 1967 they were invited to complete the questionnaire in its retrospective form. After spending six months in the University these students went for a second period of industrial training, returning to the University in February 1968. They were asked to complete the questionnaire again.

Results

A. Thin Sandwich Course

The first part of this report concerns 51 engineering students who completed the attitude scale on three occasions. The number completing it diminished on each administration: 101 did so when they entered the University in 1966, 84 six months later after their first experience of industry, and 51 after a further year when they returned from a second period in industry. Thirty per cent of the non-respondents had, in fact, dropped out of the University over the 18 months. The initial attitude scores of the non-respondents were higher (less favourable) than those of the respondents, although the differences were not statistically significant. In the autumn of 1966 the 51 students who were later successfully followed up obtained a mean scale score of 58.7, the 50 who failed to answer the questionnaire in the Spring of 1968 obtained a mean score of 59.7 ($t=0.55$, $P_{0.05}=2.01$).

Table 1: Attitudes to Industrial Training held by 51 Students of Engineering

Stage of Testing	%Very Favourable (30-54)	%Favourable (55-78)	%Uncertain (79-112)	%Unfavourable (113-136)	%Very Unfavourable (137-150)
Before first industrial period (Autumn 1966)	33.3	62.7	3.9	Nil	Nil
After first industrial period (Spring 1967)	3.9	82.4	11.8	2.0	Nil
After second industrial period (Spring l968)	7.8	52.9	33.7	2.0	Nil

In the Spring of 1967 the 51 students obtained a mean score of 69.7 and the 33 students who also completed the questionnaire at that time but failed to do so in the Spring of 1968 obtained a mean score of 72.9 ($t=1.03$, $P_{0.05}=2.01$).

The scores obtained by students of chemical, mechanical and electrical engineering respectively were substantially alike on all three administrations of the questionnaire and have therefore been combined. There was a significant deterioration in attitude during both intervals between tests, although the deterioration between the first two tests (eleven scale-points) was greater than between the second and third tests (seven scale-points). On entry to the University these 51 students obtained a mean score of 58.7 on the prospective version of the attitude scale; after their first industrial

experience their mean score on the retrospective version was 69.7. The difference between these means is statistically significant (t=6.47, P<0.001). After the second industrial period the mean score was 76.7, again a significant deterioration from the previous administration of the test. (t=3.91, P< 0.001). Table 1 shows the distribution of students on the attitude scale on the three occasions on which they were tested.

Nine items on the attitude scale which related to scientific learning received less favourable ratings after periods of industrial training. These are shown in Table 2.

Table 2: Changes in Response to Items on Practical Learning

Items plus Percentages Strongly Agreeing or Agreeing at Three Stages of the Sandwich Course[1]	Difference[2] between A and B	B and C	A and C
Industrial experience gave me a good chance to see how my theoretical knowledge works in practice. A. 98.0 B. 41.2 C. 31.4	0.001	ns	0.001
Time spent in industry was an unwelcome distraction from my studies[3]. A. 92.2 B. 78.4 C. 74.5	ns	ns	0.05
Much of what I had learned in theory became more real and had more meaning when I saw it in practice in industry. A. 98.0 B. 52.9 C. 43.1	0.001	ns	0.001
I became more self-confident in tackling technical problems. A. 94.1 B 74.5 C. 66.7	0.01	ns	0.001
During my time in industry I forgot a good deal of what I had been learning before.[3] A. 56.9 B. 31.4 C. 21.6	0.01	ns	0.001
I added a good deal to my scientific knowledge and understanding when I was in industry. A. 83.4 B. 60.8 C. 37.3	0.05	0.05	0.001
During my period of industrial practice I learned about the latest practical developments and advances in my subject. A. 62.8 B. 39.2 C. 35.3	0.05	ns	0.001
During my industrial practice I was given very efficient and helpful instructions and guidance for the work I did. A. 92.2 B. 80.4 C. 47.1	ns	0.001	0.001
I became more self-confident in tackling scientific problems. A. 86.3 B. 52.9 C. 39.2	0.001	ns	0.001

1. Percentage rating 'strongly agree' or 'Agree': A. before first industrial period, B. after first industrial period, C. after second period.
2. The significance of the difference between non-independent proportions was computed by the method in Q. McNemar, *Psychological Statistics*, Wiley: New York, 1962, p.52.
3. Scoring on these negatively worded items has been reversed.

Table 3 shows the five items relating to social and organizational aspects of industrial experience which received less favoured ratings.

Table 3: Changes in Response to Social and Organizational Items

Items and Percentages Strongly Agreeing or Agreeing at Three Stages in Sandwich Course[1]	Difference[2] between A and B	B and C	A and B
Industrial experience gave me an excellent opportunity to discover what jobs were going and what I'm most suited for. A. 92.2 B. 37.3 C. 39.2	0.001	Ns	0.001
The time I spent in industry was especially valuable for learning how a firm works. A. 100.0 B. 83.4 C. 80.4	0.05	Ns	0.05
During my time in industry I was simply a form of cheap labour. A. 90.2 B. 76.5 C. 68.6[3]	ns	Ns	0.01
I had a strong sense of purpose because I felt profits depended to some extent on how efficient I was. A. 45.1 B. 27.5 C. 13.7	ns	Ns	0.001
I had a strong sense of purpose because the results of my work were clearly useful and applied. A. 72.6 B. 51.0 C. 45.1	0.05	Ns	0.01

1. Percentage rating 'strongly agree' or 'Agree': A. before first industrial period, B. after first industrial period, C. after second period.
2. The significance of the difference between non-independent proportions was computed by the method in Q. McNemar, *Psychological Statistics*, Wiley: New York, 1962, p.52.
3. Scoring on these negatively worded items has been reversed.

The initial ratings of the 16 remaining items were either maintained or, in four cases, improved on successive administrations of the questionnaire. These are shown in Table 4.

Table 4: Items on which Ratings Maintained or Improved

Items and Percentages Strongly Agreeing or Agreeing at Three Stages in Sandwich Course[1]	Difference[2] between A and B	B and C	A and C
During my industrial experience I was little more than a dogsbody working alongside very experienced and highly qualified people. A. 66.7 B. 90.2 C. 74.5[3]	0.01	Ns	ns
When I have finished my course and am looking for a job, I expect to have the edge on graduates of other universities who have had no industrial experience. A. 86.3 B. 84.3 C. 83.4	ns	Ns	ns
During my time in industry I was lonely. A. 66.7 B. 86.3 C. 90.2[3]	0.05	Ns	0.01
The time I spent in industry was simply time spent moping around. A. 96.1 B. 92.2 C. 84.3[3]	ns	Ns	ns
Because I have had industrial experience I shall be of more immediate use to my future employer than graduates who have had no such experience. A. 94.1 B. 88.2 C. 92.2	ns	Ns	ns
During my industrial experience I worked to a considerable extent on my own without being told constantly what to do. A. 45.1 B. 70.6 C. 54.9	0.01	Ns	ns
I found out a great deal about the attitudes and practices of ordinary workmen, which will be of great value to me in my future career. A. 92.2 B. 80.4 C. 86.3	ns	Ns	ns
My period of industrial training was valuable in giving me an idea of the attitudes and outlook of management. A. 90.2 B. 64.7 C. 83.4	0.01	0.05	ns

Table 4: Items on which Ratings Maintained or Improved

In industry I was given a lot of low-level work which was of little or no help with my college studies. A. 54.9 B. 47.1 C. 39.2[3]	ns	Ns	ns
Industrial experience was little more than a holiday. A. 96.1 B. 86.3 C. 84.3[3]	ns	Ns	ns
During my industrial experience I developed more self-confidence in dealing with all kinds of people. A. 92.2 B. 80.4 C. 84.3	ns	Ns	ns
I made a lot of new friends during my period of industrial training. A. 76.5 B. 92.2 C. 76.5	ns	Ns	ns
Workmen in industry resented the amount I was paid. A. 66.7 B. 76.5 C. 66.7[3]	ns	Ns	ns
In industry I was treated as an individual. A. 70.6 B. 66.7 C. 64.7	ns	Ns	ns
During my industrial experience I found managers and senior scientists and technologists friendly and easily approachable. A. 66.7 B. 68.6 C. 62.8	ns	Ns	ns
During my industrial experience I felt I was little more than a dogsbody working alongside people who were not very highly qualified. A. 78.4 B. 84.3 C. 66.7[3]	ns	Ns	ns

1. Percentage rating 'strongly agree' or 'Agree': A. before first industrial period, B. after first industrial period, C. after second period.
2. The significance of the difference between non-independent proportions was computed by the method in Q. McNemar, *Psychological Statistics*, Wiley: New York, 1962, p.52.
3. Scoring on these negatively worded items has been reversed.

B. Thick Sandwich Course

Male students on the thick-sandwich courses (one full-year out in work during four-year degree course) in civil engineering, biology, mathematics and textiles also completed the prospective form of the questionnaire when they entered the University (N=120). Twenty-eight dropped-out over the following two years. Eighty-six of the 92 survivors (93.5 per cent) completed it again at the end of their second year in the University, before they were due to go on their year's industrial training. By comparing their scores in the autumn of 1966 and the summer of 1968 it was possible to see whether these students had changed their attitudes to industrial training during the initial two years in the University.

Table 5 shows the distribution of scores obtained by thick sandwich course students in the autumn of 1966 and again in the summer of 1968. During their two years in the University preceding their year in industry, thick sandwich course students developed significantly less favourable attitudes to industrial training. The move up the score bands, indicating diminishing expectation of the industrial experience can clearly be seen in the table.

We can also capture this shift in expectation in the mean scores. In 1966 the mean attitude score of students of civil engineering was 60.2, in 1966 67.0 ($t=4.3$, $P< 0.001$): in 1966 the mean score of students of biology, mathematics and textiles was 65.4, but in 1968, 72.0 ($t=3.71$, $P< 0.001$). Students of civil engineering, however, remained significantly more favourably disposed to industrial training than the students on other thick-sandwich courses. Neither was the change in attitude among the civil

engineering students as great as among the 51 students of other branches of engineering who had experienced industrial training on a thin sandwich course where it was more than twice as many scale points - 18 against seven.

Table 5: Attitudes to Industrial Training of Thick-Sandwich Course Students

Students	Year	Percentages in Score Bands for Attitude to Industrial Training[2]				
		30-54	55-78	79-112	113-136	137-150
Civil Engineering	Before	24.4	73.3	2.2	nil	nil
(N=45)	After[1]	15.6	73.3	11.1	nil	nil
Other[3]	Before	14.6	75.6	9.8	nil	nil
(N=41)	After[1]	4.9	68.3	26.8	nil	nil

1. After two years in the University.
2. The lower the score the more favourable the attitude
3. 'Other' are those in biology, maths and textiles.

It is notable that civil engineering students gave significantly more favourable responses in 1968 than in 1966 on the items: 'I expect to work to a considerable extent on my own, without being told constantly what to do', and 'I expect that workmen in industry will resent the amount I am paid'. Students of biology, mathematics and textiles also rated these items more favourably and, in addition, the item: 'I expect that industrial experience will give me a good chance to see how my theoretical knowledge works in practice'.

There was some indication (which fell short of statistical significance) for unfavourable ratings to be associated with drop-out. Thus among students of civil engineering, respondents in 1968 had obtained a mean score of 60.2 in 1966, while the non-respondents in 1968 had scored 64.4($t=1.65$, $P_{0.05}=2.01$). Fifteen of the 21 non-respondents (71.4 per cent) were dropouts. Respondents among students of biology, textiles and mathematics had obtained a mean score of 65.4, non-respondents 67.4 ($t=0.75$, $P_{0.05}=2.01$). All the non-respondents in this group of students were dropouts.

Discussion

The highly favourable attitudes to industrial training which students of engineering on thin-sandwich courses held when they entered the University declined significantly after six months in industry, and again after a second six-month period. Initial expectations were probably unrealistically high (no less than 96 per cent of students' attitude scores fell in the 'favourable' or 'very favourable' bands). After the first industrial period, in spite of a significant decline in attitude, no less than 86 per cent of the students obtained attitude scores which could be classified as 'favourable' or 'very favourable'- and only two per cent as 'unfavourable'. After the second period, there were still only two per cent in the 'unfavourable' band, although there was some increase in uncertainty. Initial attitudes to particular aspects of industrial experience changed, but the overall attitude remained substantially favourable.

Attitudes changed principally with regard to the integration of theory and practice. But the initial strong belief that sandwich course graduates would 'have the edge' on graduates of conventional universities remained. The equally strong belief that

sandwich course graduates would be of immediate use to an employer was also undiminished.

A very high proportion of students at the outset thought that they would learn a great deal of value about the attitudes and behaviour of both workers and managers. Experience in industry confirmed them in this belief. The students also continued to report that their experience in industry developed self-confidence in dealing with people. The general expectation that students would enjoy good relations with senior scientists and technologists was generally borne out.

The deterioration in attitude among 'thick sandwich course' students during their two years in the University probably arose from 'feedback' from students who had been out on periods of industrial training; and possibly from the attitudes of some members of academic staff. It is also possible that students' realization that degree results depend largely on performance in the university phase of their work led to some concern over the year in industry disrupting their academic studies.

A high proportion of the non-respondents in l968 were in fact dropouts - 58 out of 85 (68.2 per cent). The non-respondents also held less favourable initial attitudes to industrial training which suggests that this could have been a factor in non-completion.

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6. Musgrove, F. 'Experience of bureaucracy and attitudes to industrial training', *Irish Journal of Education* (1968), I, Pp. 54-61.

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8. Jahoda, op. cit. Only 41 per cent of the scientists and technologists at Brunel rated their first industrial experience 'good', 42.5 per cent rated it 'mixed', and 16.5 per cent rated it 'bad'.

Chapter 21: Occupational Aspirations and Expectations of Engineering Students on Sandwich Courses

Summary

Engineering students on thin and thick sandwich courses indicated their occupational aspirations and expectations at the beginning and end of industrial and university periods. During two years in university, students of civil engineering became more ambitious and came to want jobs which they did not expect to get. After two years there was some tendency for them to be more inclined to stay on at university for postgraduate research. Students on thin sandwich courses became less certain of their future field of employment after industrial experience. This was associated with a greater specificity in occupational thinking. Industrial experience tended to promote more change in probable job choices, university periods, in ideal job choices. While students on thin sandwich courses maintained their high initial levels of aspiration over two years, they did not become more ambitious. Occupational values appeared to be relatively uninfluenced by industrial or university experience.

Introduction

The professed intention of the technological universities is to provide an education related to industrial needs. To this end many of their curricula are avowedly applied in character and a special feature of their degree courses is the provision of supervised periods of experience in industry within them. Some courses are organised as thin sandwiches with alternate periods of six months spent in college and industry; others are thick sandwiches with the whole of the third year of a four-year course being devoted to industrial training. Students on sandwich courses may be sponsored by a particular firm or they may be college-based and be in receipt of maintenance grants Industry-based students often enter university straight from school.

Sandwich courses have evolved from a long tradition of on-the-job practical experience and their objectives have not been precisely formulated. Industrial experience can be expected to benefit students in a variety of ways. Smithers and Hambler[15] in a survey among applied biology graduates found that industrial experience was valued as a period of scientific training, but that it was not well integrated into the college parts of their degrees. Marris[4] found that about half of his sample of engineering and applied science students at the former Northampton College of Advanced Technology thought that industrial training contributed to the understanding of intramural course work and a further fifth thought that, while it did not do so, it was beneficial in other ways: experience of industry as a social structure for example. This also emerges in a detailed study of change in the attitudes of engineering students to industrial training reported by Musgrove and Smithers[9]. These authors found that while high initial expectations that industrial training would give relevance and meaning to academic studies were not confirmed, it was appreciated as an opportunity for learning how to participate effectively in organisations and for social learning in general. Other writers have stressed the maturing influence of industrial experience.

In the view of Onions[11], for example, “it turns school children into men and women” and “they are able to adopt a much more mature attitude to their subsequent studies”.

A more pragmatic objective of sandwich courses is to socialise students into industrial occupational roles. There is at present no generally accepted comprehensive theory of occupational choice, but recent contributions have highlighted a number of important influences. Ford and Box[2] have demonstrated that many theorists would accept the position that an individual's choice of occupation "is a function of his values and his perception of the chance of realising them in alternative occupations". In developing their theory Ford and Box have taken occupational values as given. This approach misses much according to Musgrave[9] who argues that a general theory of occupational choice must take some account of the ways in which occupational roles and preferences are learned. Roberts[12] has examined the early theories of Ginzberg[3] and Super[17] which see careers as the working out of ambitions, and has found them to be incomplete. He suggests that knowledge of the opportunity structure is crucially important and that this will strictly define the range over which an individual's values can operate.

Students entering a technological university straight from school will have been predisposed towards their fields of study by a variety of factors including their values, but they will have only a limited knowledge of subsequent employment opportunities open to them. Sandwich courses, industrial training in particular, ought to increase that knowledge, and there may be important consequences for occupational choice. This paper reports a study of change in the occupational aspirations and expectations of engineering students on sandwich courses.

Methods

As part of a longitudinal study of students entering a technological university being directed at Bradford by Professor Frank Musgrove a number of questionnaires relating to career orientations were sent to all engineering students who entered the University in 1966. Respondents were asked to say what expectations they held about what work they would do on leaving. They were also asked to indicate their degree of satisfaction with their work prospects by ticking one of five statements ranging from 'very satisfied- this is the work I really want to do and see myself in' to 'very unsatisfied; shall eventually seek a change'.

Occupational choices were also explored by means of another questionnaire. Discussions with members of staff of the engineering schools participating in this study led to the compilation of a list of nine of the most probable broad fields of employment for engineering graduates. These included 'sales', 'design', 'production', 'teaching (school or technical college)', 'research', 'construction (including site work)', 'university lecturing', 'management', and 'administrative civil service'. These were listed on a questionnaire and respondents were asked: (i) to indicate the type of work which they would ideally like if they were quite free to choose and (ii) if, for any reason, they felt they would not get what they ideally wanted, to indicate the field of employment which, in all likelihood, they probably would enter.

Research orientations were examined by asking respondents to indicate on a five-point scale ranging from 'I have a very strong desire to stay on at a university for a research degree' to 'I am quite sure that I should not wish to stay on for a research degree'

Occupational values were studied following Rosenberg[13]. Subjects were asked to indicate the degree of importance that they attached to each of the ten value variables listed in Table 6. In the first version of the instrument a three-point scale was used, but later two further categories were added in order to facilitate factor analysis of the results. This structural study has been reported elsewhere (Smithers[14]).

Levels of aspiration were measured in the manner described by Musgrove[7]. Respondents were given a vertical line marked off into nine equal units and they were asked to indicate: (i) the position they hoped to have reached by the age of 35 and (ii) the level they hoped to have achieved at the peak of their career. At three points on the scale guides were given as to the level intended. For example, the top of the scale was labelled 'Managing Director, Director of Education, High Court Judge (approx. income £4,000 plus per annum)'. An intermediate level was marked 'Head of a Research Station, Area Sales Manager, Head of Department (Schools) (approx. income £2,000 - £2,500 per annum)'. The lowest level was labelled with jobs which might reasonably be open to a newly qualified young graduate e.g. Assistant Teacher, Civil Service Scientific Officer (approx. income £1,000 - £1,600 per annum).

The Board of Engineering of the University of Bradford comprises four undergraduate schools; the Schools of Chemical, Electrical and Mechanical Engineering and the School of Civil Engineering. Courses in the first three are organised as thin sandwiches and there are two intakes of students each year. The inquiry reported here was carried out amongst the students who immediately after registering at the University went out to spend six months in industry. The battery of questionnaires described above was therefore first completed by these students immediately prior to their first experience of industrial training. Most of the questionnaires were also completed on three other occasions: (i) immediately after the first industrial period (February, 1967), (ii) a year later in February 1968 when the students had completed one college period and two industrial periods and (m) at the end of the second college period (June 1968). But questionnaires relating to employment expectations and satisfaction with those expectations were only administered on one other occasion: immediately after the first industrial period.

In contrast to the degrees of the Schools of Chemical, Electrical and Mechanical engineering those in the School of Civil Engineering were organised as thick sandwiches. Questionnaires were administered to these students on entry to the University (October, 1966) and at the end of the two-year period which their first spell in the University (June, 1968).

The combined intake of the Schools of Chemical, Electrical and Mechanical Engineering was115 male students (and only two females who were not included in the present inquiry). During the first two years of the courses fifteen students withdrew leaving 100 who were asked to participate. Of these, eighty completed the battery of questionnaires on the first and on at least one other occasion during their courses. Seventy-two students enrolled in the thick-sandwich course offered by the School of Civil Engineering in 1966 and fifty-seven successfully completed the first two years. Of these, forty-five responded to questionnaires both at the beginning of the course and at the end of the second year.

Results

It might have been surmised that the first experience of industry would make impact on students' occupational ambitions. Table 1 shows that the university-based (those without previous experience of industry) tend to become less sure of what they want to do, but unsurprisingly those entering university from industry were less affected. These industry-sponsored students are, of course, to an extent already committed in their expectations.

Table 1: Career Expectations

Type of Student	% Stating Career Choices		Critical Ratio[1]	P<
	Before	After		
Funded as Student (N=25)	88.0	44.0	3.0	0.01
Sponsored by Industry (N=47)	89.3	76.6	0.95	ns
All (N=72)	88.9	65.2	3.7	0.001

1. Calculated by McNemar's method, *Psychological Statistics*, page 53.

Significantly fewer students answered 'yes' to the question: 'do you have any expectations about the general field in which you will work when you leave university?' after a period of industrial training than did so initially. However, it is clear from Table 2 that after industrial experience students were thinking in more specific terms about future prospects. Before industrial experience about half the students named their future field of employment as chemical/electrical/mechanical engineering, but afterwards only a fifth did so, with the rest being more specific, mentioning such things as 'petrochemicals', 'heavy power transmission' and 'research (on turbine improvements)'.

Table 2: Specificity and Satisfaction of Career Aims

Career Aims	%Before	%After	Critical Ratio[1]	P<
Specific expectations	47.6	80.0	3.1	0.002
Very satisfied with future prospects	68.9	51.2	2.1	0.05

1. McNemar's[5] method.

Table 2 also shows that there was a significant tendency for student to be less satisfied with future prospects after industrial training. But, even so, 89 per cent of the students continued to be either 'very satisfied' or felt that the work 'if not ideal, would suit them'.

Student tended to ascribe their lack of a firm idea about future fields of employment to 'insufficient knowledge or experience':

> *Because it is too early in my studies to think about any particular field.*
>
> *Because as I have only done one industrial period, 5 months of which was on the shop floor working as an electrician's mate, I have not seen much of the industry. I shall probably find something to suit me later on.*
>
> *Because I feel I have to see and know about much more varieties in this field yet, before I can concentrate on one line.*

I know now the problems involved in management. This is no doubt a lucrative part of industry, but loaded with worries (i.e. top management). This has tended to reduce my ambitions about top management. I should prefer research.

I don't feel that working in a laboratory in a fairly small chemical works for 5½ months doing routine testing enables me to make a decision of this sort yet.

The whiff of dissatisfaction evident in some of these replies reflects a fairly common reaction to industrial training. Before industrial experience 92.2 per cent 'agreed' or 'strongly agreed' with the proposition 'industrial experience will give me an excellent opportunity to discover what jobs are going and what I'm most suited for'. But only 37.3 per cent (McNemar's[5] C.R.=6.3, P<0.001) were able to agree with this statement (re-cast in retrospective form) after the first industrial period. After the second industrial period 39.2 per cent expressed agreement or strong agreement. (The attitudes to industrial training of the subjects of this study have been described in detail elsewhere: Musgrove and Smithers[9]).

Table 3 shows how the students' 'ideal' and 'probable' occupations were affected by their experiences in industry. In both thin and thick sandwich courses the industrial training was associated with a shift away from Design and Research towards Production and Construction, with management aspirations and hopes increasing.

Table 3: Ideal and Probable Occupations[1]

Course	%Design/Research		%Production/ Construction		%Management	
	Ideal	**Probable**	**Ideal**	**Probable**	**Ideal**	**Probable**
Thin sandwich						
On entry (N=80)	52.5	33.7	20.0	42.5	22.5	17.6
After 1st industrial period (N=72)	54.1	26.4	23.6	52.8	16.6	18.1
After 1st college and 2nd industrial period (N=55)	61.9	38.1	12.7	32.7	18.2	23.6
End of 2nd college period (N=57)	45.7	24.6	24.6	36.9	26.3	29.9
Thick sandwich						
On entry (N=43)	20.8	15.9	69.7	77.4	7.0	4.5
After 2 years in college (N=43)	34.9	15.9	32.6	70.5	32.6	13.6

1. Change significant by McNemar's test beyond 1 per cent level **; beyond 0.1 per cent level***.

During the first industrial period 25 per cent of the students on thin sandwich courses changed their ideal choices and the proportion increased to 38.3 per cent in the year spanning the first college and the second industrial period. In the second college period 39.6 per cent of the students changed their ideal choices. There was even more

change in probable choices: 44.0 per cent during the first industrial period; 44.8 per cent during the first college period plus the second industrial period and 36.4 per cent during the second college period.

The indications in the data that college studies tended to promote more change in ideal choices and industrial experience in probable choices are supported by the responses of the civil engineering students. Sixty point four per cent of these students (as yet without industrial experience) had changed their ideal choices, but only 34.9 per cent their probable choices in the first long intramural period.

As the data of Table 3 show change in the ideal choices of the students of civil engineering was away from construction work towards research (C.R.=1.39, P_{05}=1.96) and management (C.R.=2.56, P< 0.01). But most of the students continuing to expect to enter construction. Musgrove[7] has defined an 'index of frustration' as the proportion of students who do not expect to be able to enter the field of employment they ideally would wish. Using the combined categories of Table 3, anticipated frustration of the civil engineering students increases from 0.34 on entry to college to 0.54 at the end of the second year.

Changes in the ideal occupational choices of the students on thin sandwich courses are not oriented in any particular direction and there are no significant changes between the four surveys. The same is true for probable choices although there is some tendency (C.R.=1.46, P_{05}=1.96) for more students to expect to be able to enter management over the period of two years.

About half the students ideally wish to enter the field of research and design, but only about a third expect to be able to do so. About twice as many expect to have to enter production/construction as really want to do so. The index of frustration for these students rises from 0.4 to 0.5 during the first industrial period, but thereafter remains unchanged: 0.5 at the end of the second industrial period; 0.48 at the end of the second college period.

The increased inclination of the students of civil engineering towards research is accompanied by a greater tendency (CR=1.66, P_{05}=1.96) after two years to wish to remain at university for a research degree. But the proportion, initially very low, is still lower than that of the other engineering students.

Table 4 shows that the desire to stay on is apparently little influenced by either college studies or industrial experience. Industry-based students did not differ significantly from college-based students in this respect.

Table 4: Desire to Stay on at University for a Research Degree

Course	%Some desire to stay on	%No inclination one way or other	%No wish to stay on
Thin sandwich			
On entry (N=80)	51.2	33.8	15.0
After 1st industrial period (N=72)	55.4	34.9	9.7
After 1st college and 2nd industrial period (N=55)	55.8	23.1	21.1
End of 2nd college period (N=57)	57.6	25.4	17.0
Thick sandwich			
On entry (N=43)	26.5	46.5	26.5
After 2 years in college (N=43)	44.5	22.2[1]	33.3

1. Change significant beyond 2 per cent level.

Students of civil engineering differed from the engineering students on thin sandwich courses in the extent of change in their levels of aspiration. The data of Table 5 show that after two years within the University the levels at which the civil engineering students placed themselves on the aspiration scale at both 55 and the peak of their careers increased significantly over even the very high initial levels (cf. Musgrove[7]). The aspirations of the other engineering students (as high as those of the civil engineering students initially) did not change during the two years of industrial and intramural experience (Table 5).

Table 5: Levels of Aspiration

Stage[1]	Per Cent with High Levels of Aspiration	
	Age 35 (Levels 5-9)	Peak of career (Levels 7-9)
Thin sandwich		
On entry (N=80)	66.1	72.5
After IP (N=70)	65.8	74.2
After 1st UP and 2nd IP (N=48)	71.0	71.0
At the end of the 2nd UP (N=56)	61.0	75.0
Thick sandwich		
On entry (N=44)	67.5	72.9
After 2 years in University (N=44)	86.5[2]	93.2[2]

1. UP stands for university period; IP for industry period.
2. Change significant beyond 5 per cent level.

Other occupational values of the thin sandwich students also remained remarkably constant during both industrial and college periods. During the first industrial period (Table 6) there were no significant changes in occupational values although there was some tendency to attach more weight to 'freedom from supervision' (C.R.=1.48, P_{05}=1.96) and less to 'adventure' (C.R.=89, P_{05}=1.96) after the experience. During the second college period there were similarly few changes in emphasis. There was a

significantly greater tendency to consider 'adventure' more important (C.R.=2.3, P<0.05) and somewhat more importance was attached to the opportunity to exercise leadership (C.R.=1.46, P_{05}=1.96).

Table 6: Occupational Values

Value	% High Importance[1]			
	First Industrial Period (N=72)		Second University Period (N=44)	
	Before	After	Before	After
Provide me with a chance to earn good money	59.7	58.2	82.0	86.2
Provide an opportunity to use my special abilities	73.5	72.2	84.0	86.2
Give me an opportunity to work with people rather than things	18.1	16.7	31.8	34.1
Enable me to look forward to a stable, secure future	80.6	78.3	70.9	75.0
Give me social status and prestige	5.5	8.3	20.4	22.7
Give me an opportunity to be helpful to others	23.6	25.0	29.5	34.1
Permit me to be creative and original	58.2	55.5	63.8	72.8
Leave me relatively free of supervision by others	37.6	43.1	66.1	79.8
Provide me with adventure	29.2	20.8	18.2 *	38.7
Give me a chance to exercise leadership	25.0	23.6	45.5	56.9

1. Three-point scale used for first industrial period, but a five-point scale used for the second university period.
* Change significant beyond 5 per cent level.

Discussion

Students entering the engineering schools of a technological university appeared to have only vague and very general expectations about their future fields of employment. But after six months in industry they were able to think in more precise terms about their future vocational roles. Some students see a university education as a way of deferring career decisions, and they look to intramural studies and industrial experience to make them aware of the opportunities available. The students appeared to be disappointed with this aspect of industrial training. Nevertheless a greater specificity was detectable in their occupational thinking after industrial experience.

Nisbet and Grant[10] have described the uncertainty of students' vocational intentions in the early stages of their university studies. In a longitudinal study of Arts students at the University of Aberdeen they found that about 'one-third made final decisions on a career before entry to university, one-third during the course, and one-third after graduation.' In the present study only a minority of students remained constant in their ideal and probable occupational choices over a period of two years. Comparison of the industrial and college periods of thin sandwich courses suggests that the former may tend to promote more change in probable choices, the latter in ideal choices.

Nearly two-thirds of the civil engineering students modified their ideal choices during two university years, but only one-third their probable choices. Studies in college seem to exert a greater effect on aspirations, work in industry on expectations.

Musgrove[7] has reported in detail on the ambitions of the subjects of this inquiry and other students entering a technological university. He found that levels of aspiration appeared to be determined primarily by field of study and he points the contrast between the high ambitions of the scientists and technologists on the one hand and the lowly aspirations of the social scientists and linguists on the other. The high levels of aspiration of the engineering students on thin sandwich courses were undiminished by two industrial experiences and, in fact, remained remarkably constant over a period of two years. Students of civil engineering with equally high levels of aspiration initially became even more ambitious during two uninterrupted years in the University; when looking ahead to the peak of their careers no less than 93 per cent placed themselves on one of the top three positions of the aspiration scale (approx. salary in the region of £4,000+).

The detailed and thorough work of Strong[16] has shown how massively stable vocational interests can be. In the present study the major value-orientations of the students remained unchanged by college experiences or acquaintance with industry. Apart from fluctuations in the importance attached to adventure, the changes that did occur were concerned with authority relationships in work. Students tended to attach greater relative importance to freedom from supervision after experience of industry than before. This is in accord with the finding of Musgrove[8] and Cohen[1] that deterioration in attitude to industrial training appears to be related to experience of bureaucracy. A desire to be free from supervision was accompanied by an increased desire to exercise leadership.

Research indicates that occupational values act to predispose the general direction in which employment is sought, but that other factors are involved in specific decisions. Knowledge of the opportunity structure may be important here. Civil engineering students remaining in the University for two years develop higher levels of aspiration and come to ideally want jobs that they doubt that they can achieve. On the other hand while the aspirations of chemical, electrical and mechanical engineering students with industrial experience remain high they do not increase and probable job expectations are modified more than ideal choices. Industrial experience may represent a formula for realism and adjustment. Continuation of this longitudinal study will trace the reaction of students of civil engineering to industrial experience.

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Chapter 25: Occupational Values of Freshmen

Summary

One group of factors predisposing students towards different fields of study is the anticipated satisfactions of their future careers. Freshmen students of applied science and technology look towards both the intrinsic and extrinsic rewards of work, but attach relatively little importance to working with people or being helpful to them. In this they differ markedly from students in other fields. The low people orientation of scientists may be one reason why they are so difficult to attract into teaching.

Introduction

The declining proportion of sixth-formers attracted to the study of the sciences is a matter of national concern. The Dainton Committee[1] has recently set out the position in detail. It reports that although there has been some increase in the number of pupils reading science in the sixth-form, it is very much less than in non-science subjects. If, as seems likely, the trend of the last ten years continues into the seventies, then in 1971 only about one-quarter of the sixth-form will be reading science. The available published evidence[2] suggests that this will be inadequate to meet the growing demand for scientists and technologists. The shortfall is likely to be particularly acute in teaching and in industry. As the Swann Report[3] makes clear, these sectors have considerable difficulty in attracting the most able graduates away from pure research.

There is no simple explanation of the swing away from the sciences. Amongst many possibilities, the Dainton Committee attaches importance to: the narrow and rigorous commitment demanded by existing science curricula; the lack of imaginativeness in science teaching, and insufficient knowledge about the real nature of employment opportunities. But it also recognises that the "root causes may lie more deeply in the individual". It urges that further research be carried out in order to elucidate these 'personal factors'.

The study reported below is a contribution to this field. It describes the values which freshmen applied scientists and technologists hope to satisfy in their future careers, and contrasts these values with those of other freshmen in the same intake.

Methods

As part of a longitudinal study of the career orientations of Bradford undergraduates, all students in one intake were asked to complete an occupational-values questionnaire. Following Rosenberg[4], subjects were asked to indicate on a three-point scale the extent to which a job or career would have to satisfy ten possible requirements - these are listed in Table 1 - before it could be considered ideal. The three points on the scale were labelled: (1) of high importance (2) of medium importance and (3) of low importance.

Seven hundred and fifty-seven students completed the questionnaire - more than 93 per cent of the intake. Of the respondents, 649 were males and 108 females. American research (e.g. Goldsen *et al*[5]) finds that there are considerable differences in the occupational values of men and women. When all males are compared to all females this is supported by the present project, but when field of study is controlled for, the

differences to a large extent disappear. An exception is 'security', which is much less important as a work value for female students.

The present report focuses on male student compared by field of study. The four groups discussed are based on the four Boards of Study of the University of Bradford. The Board of Engineering comprising Schools of Chemical, Civil, Electrical and Mechanical Engineering is taken as one group and the Board of Social Sciences (except the business students (N=31) who have been considered elsewhere, Smithers[6]) as another. The two Schools comprising the Board of Life Sciences were found to have diverging values reflecting different intended careers. Accordingly, they have been separated and the pharmacists have been combined with the opticians who they resemble and the applied biologists have been grouped with the mathematicians, applied physicists, material scientists, chemists, colour chemists, and textile technologists.

Results

The data of Table 1 show that the occupational values of applied scientists and engineers are very similar, but they differ sharply from those of students of arts and social science, and pharmacy and optics.

Table 1: Occupational Values

Value Variable	% ' High Importance'[1]			
	Arts & Social Science (N=82)	Pharmacy & Optics (N=66)	Engineering (N=276)	Applied Science (N=194)
Provide me with adventure	29.3	13.6	32.2	29.9
Provide me with a chance to earn good money	32.9*+	43.9*+	64.9	60.8
Provide an opportunity to use my special abilities	81.7	69.7	75.4	78.4
Provide me an opportunity to work with people rather than things	59.8*+	50.0*+	21.0	22.2
Enable me to look forward to a stable, secure future	51.2	74.2	74.6	76.8
Give me a chance to exercise leadership	23.2	16.7	24.6	22.2
Give me social status and prestige[2]	2.4	7.6	11.6	12.4
Give me an opportunity to be helpful to others	41.5	66.7	26.1	35.1
Permit me to be creative and original	48.8	25.8	54.7	55.7
Leave me relatively free of supervision by others	50.0**	30.3	43.8	41.2

1. Chi-squared between the various groups calculated on frequencies rating 'of high importance' vs. others. Significant differences ($P < 0.05$) are shown as follows: underlined different from all other groups; * different from applied scientists; + different from engineers; ** different from pharmacists and opticians.
2. On this item only, χ^2 calculated on frequencies rating 'of no importance' against others.

All groups of students excepting the pharmacists and opticians (who were sometimes frustrated medical students) attached greatest importance to making use of 'special abilities' in their future careers. Applied scientists and engineers also attached great weight to earning good money and being able to look forward to a stable, secure future. In both these ambitions they differed significantly from students of arts and social science. Like the technologists, the pharmacists and opticians placed much emphasis on 'security', but rather curiously in view of the reported[7] financial returns of their professions, they placed less weight on 'good money'.

Students of pharmacy and optics also differed significantly from other students with science backgrounds in the high importance which they attached to working with people and being helpful to them. In this they resembled students of arts and social science. A distinctive feature of students of engineering and applied science appears to be the low importance which they attach to work as a social activity.

Students of applied science and engineering placed emphasis on the opportunity to be creative and original. Students of arts and social science similarly gave weight to this value, but it tended to be not of high importance to the pharmacists and opticians. These students were also less concerned about 'adventure' than their contemporaries. Apparently 'status and prestige' was the least important aspect of future occupation for all groups of students, though there may have been some reluctance to admit such a student-like thing. Students of arts and social science gave it even less weight than other groups of students. To be left fairly free of supervision was considered a relatively important job-characteristic by all groups of students; more so than the chance to exercise leadership.

Discussion

The results of this inquiry suggest that one group of factors predisposing students towards different fields of study is the values which they hope to satisfy in their future careers. At a first level of analysis, it has been found (Ginzberg *et al*[8]; Super[9]) convenient to recognise three clusters centred on:

(1) the work itself (intrinsic rewards);

(2) returns of work in the form of money and security (extrinsic rewards);

(3) opportunity of working with people.

Rosenberg[4] in a nationwide survey of American college students distinguished three major clusters of responses amongst the value variables used in the present study. He found that emphasis on 'special abilities' tended to be associated with 'creative and original'; 'good money' with 'security' and 'status'; and 'people' with 'helpful'. These findings have recently been confirmed amongst engineering students in this country (Smithers[10]). Rosenberg[4] identified the three value-orientations with the three components of work satisfaction previously described.

Viewed in these terms, students of applied science and engineering are both intrinsic-rewards oriented and extrinsic-rewards oriented. The emphasis placed by scientists on intrinsic satisfactions has been noted many times (for a review see Kaplan[11]). Eiduson[12], particularly, stresses their 'strong ego involvement' in work and suggests

that they value work 'primarily as permitting expression of inner personality'. An accompanying emphasis on the returns of work may be characteristic of the applied scientist and technologist.

Students of arts and social science differ from the technologists in not being extrinsic-rewards oriented, but the most discriminating value-orientation is that concerned with people. Students of pharmacy and optics appear to be mainly motivated by the desire to be helpful to others and they attach relatively low importance to being creative and to earning good money. Students of arts and social science can similarly be described as people-oriented, but the social aspect of work is of comparatively little importance to applied scientists and technologists. This is in accord with much previous research. Roe[13], for example, in her classification of occupations noted that amongst technologists "interest in personal interaction is generally low, perhaps at the lowest for all the Groups" (and interest amongst scientists was not much above that of technologists). In McClelland's[14] generalizations about creative scientists he notes that "scientists avoid interpersonal contact". Similar findings have been reported in this country by Hudson[15]. Terman's[16] study of a sample of highly gifted children suggests that this lack of sociability emerges at an early age and is an enduring characteristic. Strong's[17] follow-up study of nearly nine hundred Stanford University graduates eighteen years after they had left college demonstrated the immense stability of interpersonal and other interests.

The present study suggests that applied science and technology students when looking ahead to their future careers tend to be both intrinsic-rewards and extrinsic-rewards oriented. It also confirms previous research which indicates that the sciences are particularly attractive to people who attach low importance to interpersonal relations. The low people-orientation of scientists may explain why it is so difficult to attract science graduates, particularly those in the physical sciences into teaching. American research[4] has shown teaching to be one of the most people-oriented of occupations.

A study of the distribution of occupational values in school children would provide some indication of the likely success of the proposed Dainton reforms in countering the recent disturbing swing away from the sciences.

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Chapter 27: The Structure of Occupational Value Orientations

Summary

Previous attempts to establish general occupational value orientations have been somewhat arbitrary. Factor analysis of the values of engineering students suggests that there may be three main orientations: towards (1) self-expression (ii) extrinsic rewards and (iii) people. In these terms, engineering students tend to be self-expression and extrinsic-rewards oriented, but not people oriented. The people-oriented students in the group tended to be looking towards a career in management rather than engineering per se.

Introduction

Values are recognised as important determinants of many aspects of human behaviour, including occupational choice. J R Butler[1] put it thus: "It has often been assumed that people will be most attracted to those occupations which incorporate or symbolise their personal values". More explicitly Box and Ford[2] envisaged a process in which: "In choosing between alternative occupations, a person will rank the occupations in terms of the relation between his values and the perceived characteristics of the occupation". The theoretical and empirical study of occupational values promises much for the understanding of vocational behaviour. An important prerequisite is the identification and ordering of the relevant value variables.

In their pioneering work in the field of occupational choice, Ginzberg *et al*[3] distinguished three major components of work satisfaction: the returns of work in the form of income and prestige; the work activity itself; and the concomitant satisfactions such as working in a particular environment or with a particular group. Although not empirically based, this trinity has gained widespread acceptance and has influenced much subsequent research. It has found perhaps its most fruitful expression in the work of Rosenberg.[4] Starting with a list of ten possible satisfactions to be had from the ideal job or career, Rosenberg isolated three underlying constructs: a self-expression orientation; an extrinsic-rewards orientation; and a people orientation. These value complexes were found to be differentially distributed among students according to intended occupations. Thus when eighteen prospective occupations were compared, social work, medicine and teaching were found to be the most people oriented, and engineering and natural science, the least. Beginning with a different list of twelve value variables, Schwarzweller[5] has identified three very similar value clusters.

These confirmations of the tripartite formulation of occupational values operationalized by Rosenberg suggest that it might be a useful approach to the empirical study of occupational choice. Several aspects of the methodology by which it was derived, however, give cause for concern. The three value complexes were isolated by reference to a coefficient of association. Details of this measure were not given and the question of statistical significance was not considered. It is therefore difficult to know precisely what meaning to attach to the coefficients presented. Although the three largest coefficients were taken as the three value complexes several other large positive relationships were ignored. This seems to have been because value variables ('freedom from supervision', 'chance to exercise leadership', and

'adventure') were involved which are elsewhere rejected as 'minor alternatives'. But, in fact, respondents attached more importance to two of these work values than 'status and prestige' which is retained as an important measure of extrinsic-rewards orientation. The procedure also seems somewhat arbitrary in the elaboration of one of the complexes. The desire for a stable, secure future was added to the extrinsic-rewards orientation because it looked as though it belonged there.

At the University of Bradford a longitudinal study of the educational and occupational values of an entire intake of students is being conducted. As part of the developmental work for this study Rosenberg's occupational values questionnaire, modified to permit the use of conventional correlational and multivariate techniques, was given to a sample of engineering students. This paper reports a re-appraisal of Rosenberg's findings and examines the occupational value orientations of engineering students.

Methods

Second-year students in the Schools of Mechanical, Electrical and Chemical Engineering of the University of Bradford were sent questionnaires through the internal mailing system of the University. Eighty-eight students, 61 per cent of the total, replied. By reference to questionnaires previously completed by the respondents and non-respondents it was possible to establish the representativeness of the sample.

Students were asked to indicate on a five-point scale ranging from 'essential' to 'of no importance' the weight which they attached to each of the ten occupational value variables originally listed by Rosenberg (see Table 1). The responses were inter-correlated and subjected to a principal components analysis. Three factors with eigenvalues greater than one were extracted. These were rotated by a Varimax procedure. At the time of the analysis the only Varimax programme available took the largest correlation in the main diagonal as the best estimate of communality. With as few as ten variables this is probably an underestimate.

A questionnaire was also included to ascertain the students' job preferences. Discussions with colleagues in the Schools of Engineering involved in this study led to the compilation of a list of nine possible fields of employment for engineering graduates e.g., 'design', 'management', 'construction (including site work)' and 'production'. These were listed on a questionnaire on which the respondents were asked to indicate their probable destinations.

Results

Clear differences in the values which engineering students hope to satisfy in their future employment emerged in the data of Table 1. About four-fifths of the students rated 'a chance to earn good money' and 'an opportunity to use my special abilities' as an essential or highly important characteristic of their ideal job or career. Nearly as many considered it as important to be able 'to look forward to a stable, secure future'. Fewer students wished to be 'creative and original' or to be left 'relatively free of supervision by others', but the proportion rating these as 'essential' or 'of high importance' was still large. In contrast, only about one-quarter of the students attached more than moderate importance to the 'opportunity of working with people rather than

things' or being 'helpful to others'. A similarly small proportion attached high importance to 'social status and prestige'.

Table 1: Occupational Values of Engineering Students (N=88)

Occupational Values	Per Cent Rating 'Essential' or 'Of High Importance'	'Of Medium Importance'	'Of Low or 'Of No Importance'
Provide me with adventure	35.2	42.1	22.7
Provide me with a chance to earn good money	82.9	17.1	nil
Provide an opportunity to use my special abilities	79.5	18.1	2.3
Give me an opportunity to work with people rather than things	26.1	45.5	28.4
Enable me to look forward to a stable, secure future	73.8	20.5	5.7
Give me social status and prestige	26.1	36.4	37.5
Give me an opportunity to be helpful to others	28.4	44.3	27.3
Permit me to be creative and original	69.3	23.9	6.8
Leave me relatively free of supervision by others	64.8	25.0	10.2
Give me a chance to exercise leadership	52.3	32.9	14.8

The data on which Table l is based were subjected to a principal components analysis followed by rotation according to the Varimax criterion. This gave the results which are presented in Table 2. The three factors exposed by Varimax analysis have much in common with the value complexes isolated by Rosenberg.

Factor I contains the elements of Rosenberg's people orientation loading significantly on 'work with people' and 'helpful to others'. In addition it also loads on the wish for a 'chance to exercise leadership' and the desire for 'adventure'. The value variable 'helpful to others' is also loaded by Factor II which is otherwise closely similar to Rosenberg's extrinsic rewards orientation. This factor loads most heavily on the desire for a 'stable, secure future' and is also strongly expressed in 'the chance to earn good money' and 'status and prestige'. It differs from the extrinsic rewards value complex in that it appears to be more strongly represented by 'security' and 'good money' than by 'status and prestige'. Rosenberg's data also suggest that this might be the case and he does include a weighted average score for 'security' in his ranking of prospective occupations on extrinsic rewards orientation. The two studies are in agreement in finding that students characteristically attach relatively little importance to obtaining 'social status and prestige' from their future careers.

Table 2: Varimax Analysis of Occupational Values (Decimal Points Omitted)[1]

Variable	Rotated Factors		
	I	II	III
Adventure	59	02	-01
Good money	00	62	-22
Special abilities	-02	-05	56
Work with people	68	04	-02
Security	06	73	03
Status and prestige	18	51	13
Helpful to others	44	31	17
Creative and original	15	-09	61
Freedom from supervision	05	13	50
Leadership	62	16	34
% Variance	14.5	13.2	11.5

1. Significant loadings (> 30) underlined.

Factor III is most heavily loaded on 'use my special abilities' and 'permit me to be creative and original'. These were the two variables which Rosenberg used as measures of his self-expression orientation. There is also some loading on 'leave me relatively free of supervision by others' which suggests that Factor III may appropriately be called a self-expression factor.

As with Factor II there is some overlap of this factor with Factor I -'the chance to exercise leadership' is loaded by both. Rosenberg's suggestion that self-expression values may be more distant psychologically from extrinsic-reward values than are people-oriented values receives some support from this study. In addition to the observed overlap of Factors II and III with Factor I (but not with each other), there is some suggestion that the 'chance to earn good money' may be inversely correlated with the self-expression factor (Table 2). But, in general, Rosenberg's observations with regard to the existence of a spectrum of psychologically contiguous values were not confirmed.

As Table 3 shows, on the basis of their product-moment correlation coefficients, it is possible to place the variables in an order closely similar to that reported by Rosenberg. Only a few of the coefficients, however, reach the five per cent level of significance. Some of Rosenberg's coefficients of association are also quite small and it is a pity that he does not give any attention to the question of statistical significance. In spite of the large sample involved in the Cornell Study it may well be that the people-oriented values are not related to the self-expression values. Keeping to the sense in which these terms were used by Rosenberg, this is the case in the present study.

Although the majority of the engineering students who were the subjects of this study did not consider the 'opportunity to work with people rather than things' and 'the opportunity to be helpful to others' to be 'essential' or 'highly important' work characteristics about a quarter did so. The question arises, therefore, do engineering students emphasizing people-oriented values differ in the fields of employment to

which they are attracted compared with the non-people-oriented? This was examined by assigning a score of five for ‘essential’ through to one for ‘of no importance’ according to the weight attached to the two people-oriented values. The two scores were then combined to give a scale ranging from two to ten. Students with a score of seven or more were taken as people-oriented and students with a score of five or less as non-people-oriented, Of the 61 students categorized in this way, 51 expected to take up employment in industry.

Table 3: Product-Moment Correlation Coefficients[1,2]

	Values Ordered According to Size of Correlation Coefficient										Order Reported by Rosenberg (1957)
		2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
1.	Creative	**36	**31*	**30	16	02	13	07	-04	-19	I
2.	Abilities		24	20	-11	06	08	-08	00	-08	II
3.	Supervision			22*	10	-01	10	19	09	-03	-
4.	Leadership				**40	**45	**35	**34	13	02	-
5.	Adventure					**37	18	06	02	12	-
6.	People						**37	11	05	03	IV
7.	Helpful							19	**39	04	III
8.	Status								**36	*26	V
9.	Security									**48	VII
10.	Money									-	VI

1. Decimal points omitted.

2. Statistical significance: * beyond 5% level; ** beyond 1% level (N=88).

As Table 4 shows, people-orientation was significantly related to the expected field of employment, the non-people-oriented students tending towards design, construction and production work and the people-oriented towards the management side of industry. In this connection, it is interesting to note that ‘a chance to exercise leadership’ and Rosenberg’s people-oriented value variables are loaded by the same factor in the present study.

Table 4: Probable Employment and People Orientation[1]

Probable Employment	People-Oriented	Non-People-Oriented
Design, Construction and Production	17	22
Management	10	2

1. χ^2=4.33, PS 0.05.

Discussion

The data reported in this paper confirm and extend some of Rosenberg’s findings[4] and also bear upon the work of other investigators. The three factors extracted by Varimax analysis are very similar to the three value complexes described by Rosenberg. One factor is predominantly loaded on those value variables which he associated with extrinsic-rewards orientation and can be named accordingly. To a lesser extent this

factor is also loaded on the desire to be 'helpful to others'. Super[6] in his categorization of occupational values includes 'altruism' amongst the intrinsic rewards of work.

In the present study valuing work for its own sake appears to have little in common with doing good to people; the indications are that a self-expression oriented person is a self-centred person. The desire to be helpful to others is loaded most strongly by a factor which also loads on 'an opportunity to work with people rather than things'. In addition, 'leadership' and 'adventure' are also associated with this factor. Similar results were obtained (but not discussed) in the Cornell Study.[4]

Most of the engineering students in the present study tended to discount the four variables loaded by Factor II. Whether students who positively seek people-oriented occupations (e.g. prospective social workers) also emphasize 'leadership' and 'adventure' as work values awaits further study.

The third factor in the present analysis loads most strongly on 'use of special abilities' and 'creative and original'. It is, therefore, the equivalent of Rosenberg's self-expression orientation. Consistent with this notion there is also some loading on 'relatively free of supervision by others'. A high level of association between 'creative' and 'freedom from supervision' is also recorded in the Cornell Study.

A number of other factor analytic studies of work values and work interests have isolated a dimension concerned with interpersonal relations[7]. The relative importance attached to working with people and working with things may be one aspect of a fundamental dichotomy. Joyce and Hudson[8] have recently published a questionnaire designed to distinguish convergent and divergent thinkers as defined by Hudson[9]. Several items in the questionnaire bear upon the people vs. things dimension and one item specifically asks for agreement or disagreement with: 'I would rather work with things than with people'. Similarly, from the items of the Eysencks'[10] extraversion scale, it seems reasonable to suppose that introverts may be more inclined to work with things, and extraverts with people. Unpublished work by the author has found evidence for this.

Both Rosenberg's findings and the present study add to the mounting evidence[11] that a distinctive feature of engineering and other physical science occupations is that they tend to attract people who attach relatively little importance to interpersonal relations. In this sense the 25 per cent of the present sample who could be described as people oriented represent a deviant group. These students were significantly over-represented among those looking towards a career in management.

Rosenberg's demonstration that occupational values are differentially distributed across students intending to enter different occupations, and the present finding that people orientation is related to anticipated future employment, bear out theories which emphasize the importance of values in occupational choice. The identification of similar types of orientation in different countries using different methods suggests that the constructs of intrinsic-rewards orientation, extrinsic rewards-orientation and people-orientation may have some basis in reality.

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Chapter 29: Work and Sex

Summary

The occupational values of male and female students at a technological university were compared on entry and after two years. Overall female students were found to be the more people-oriented, males the more extrinsic rewards-oriented and the more inclined towards leadership. But within fields of study values were very similar. On entry, female students attached less importance than males in the same subject area to extrinsic rewards, particularly security, but over two years this difference largely disappeared. The general similarity of occupational values within subject areas is taken as supporting theories of occupational choice which stress the importance of values.

Introduction

Sex is an important mediator in occupational choice. It affects the nature of ambition (Turner, 1964) determines the relative importance of the work role (Psathas, 1968) and, to a large extent, limits choices to occupations deemed appropriate. Where the occupational values of men and women have been compared (e g Goldsen, Rosenberg, Williams and Suchman, 1960) they have been found to differ markedly. In general, men have been found to be the more concerned with extrinsic rewards of work like money and status, and women, the opportunity of working with people. In Rosenberg's (1957) terminology, men tend to be extrinsic-rewards-oriented, women, people-oriented.

Fields of employment can also be classified in these terms. Rosenberg (1957), in America, ranked a number of occupations according to the value pattern prevailing among prospective entrants. In terms of people-orientation such occupations as social work, teaching and medicine came out highest, and engineering and natural science lowest. On extrinsic-rewards-orientation, social work and teaching were ranked lowest with various business occupations holding the top places followed by medicine and engineering. Somewhat similar findings have been made among male students at a British technological university (Smithers, 1969). As in Rosenberg's study, the social and health scientists were found to be people-oriented, the engineers and applied scientists non-people-oriented. Again, the social scientists differed from health scientists, applied scientists and engineers in the comparatively low importance which they attached to the extrinsic rewards of work.

The process of occupational choice is not fully understood, but some process of compromise between values and opportunities is generally envisaged (c.f. Ginsberg, Ginsburg, Axelrad and Herma, 1951; Ford and Box, 1967). Given this determining influence of values, it is to be expected that women will eschew engineering and applied science, and espouse the social and health sciences. This is so evidently the case as hardly to need quantification. But it is also true that some women do become scientists. What of these women? Are they non-people-oriented like their male counterparts or do they look for something different in the activity of science? Or to put it more generally: when men and women incline towards the same occupation do they share the same pattern of values or are there differences reflecting the overall differences in the value patterns of men and women. Some evidence in favour of the

second alternative has been obtained by Super and Kaplan (1967). In a study of the occupational values of school counsellors in America, they found that while in some respects the values of men and women were very similar, for example with regard to people-orientation, men counsellors generally placed more stress on the extrinsic rewards of work.

It is possible to examine the question further by drawing on some data available from a longitudinal study of students entering the University of Bradford. This is a technological university in which the majority of courses are occupationally relevant so that to a certain extent to choose a degree course is to choose a career.

Methods

Details of the longitudinal study of the Bradford intake of '66 have been given in a previous paper (Smithers, 1968). All students entering the University of Bradford in October 1966 were asked to complete a battery of questionnaires including Rosenberg's (1957) occupational values questionnaire. Seven hundred and fifty-seven, or 93 per cent of the intake did so. Of these, 108 were female, including 54 in arts and social science, 25 in health sciences (pharmacy and optics) and 20 in applied science. These three broad subject areas were taken as the basis of the sex comparison. Of 279 engineering students in the intake only three were female. Two years after entry, in June 1968, the questionnaire was administered to the same students again. Eighty-seven per cent of the students involved in the within-fields-of-study comparison responded again (not counting 44 who had dropped out in the meantime).

Table 1: Occupational Values on Entry

The ideal job would:	% 'of high importance'[1]		Chi-squared (df=2)	P<
	Males (N=649)	Females (N=108)		
Provide an opportunity to use my special abilities	76.3	88.0	6.69[2]	0.01
Enable me to look forward to a stable, secure future	71.8	34.3	58.46	0.001
Permit me to be creative and original	50.8	38.9	60.43	0.001
Give me an opportunity to be helpful to others	35.1	53.7	13.90	0.001
Provide me with a chance to earn good money	57.6	28.7	40.06	0.001
Give me an opportunity to work with people rather than things	30.5	64.8	46.29	0.001
Give me a chance to exercise leadership	23.6	8.3	26.25	0.001
Leave me relatively free of supervision by others	42.7	32.4	8.02	0.025
Give me social status and prestige	10.6	4.6	8.59	0.025
Provide me with adventure	29.0	21.3	26.01	0.001

1. 3-point scale.
2. 'Of high importance' against other two categories combined (df=1).

Results

In Table 1 the occupational values on entry of all males and all females in the sample are compared. It shows that there were significant differences on every item, the differences falling very much into the pattern previously described by Goldsen *et al* (1960). Female students were significantly more concerned with working with people and being helpful to them, males with the extrinsic rewards of work such as security, good money and status. In addition, male students attached more importance to exercising leadership and to being free from supervision.

With field of study controlled, however, as in Table 2, the differences to a large extent disappear. Table 2 shows that female applied scientists like their male colleagues attached significantly less importance to working with people than did students in other fields. And likewise, applied scientists of both sexes attached significantly less importance to being helpful to others than did their counterparts in the health sciences. Both male and female health scientists were characterised by the relatively low importance which they attached to 'creativity' and 'adventure' as work values. There were no differences between male and female students in their desire to make use of 'special abilities'.

Table 2: Occupational Values on Entry by Sex and Field of Study

Value Variable	'Of high importance'					
	Arts and Social Science		Health Science		Applied Science	
	Male (N=82)	Female (N=54)	Male (N=66)	Female (N=25)	Male (N=129)	Female (N=20)
Abilities	81.7	92.6	69.7	76.0	80.2	85.0
Security	51.2[1,2]	27.8	74.2[1]	40.0	79.1[1]	40.0
Creative	48.8	37.0	25.8[2]	20.0	55.2	55.0[3]
Helpful	41.5	57.4	66.7[2]	72.0	36.0	35.0+
Good money	32.9	27.8	43.9	20.0	58.7[1]	30.0
People	59.8[1]	81.5	50.0	64.0	21.5[1]	30.0[2]
Leadership	23.2[1]	7.4	16.7	8.0	22.1	10.0
Supervision	50.0[1]	31.5	30.3	40.0	41.3	25.0
Status	2.4	3.7	7.6	4.0	12.2	5.0
Adventure	29.3	22.2	13.6[2]	12.0	29.1	20.0

1. Difference significant beyond 5 per cent level for comparisons within field of study by chi-squared (df=1).
2. Within sex difference significantly different from both other fields.
3. Within sex difference from significantly different from health scientists.

The general pattern of similarity between male and female values within fields of study is cut across by differences in extrinsic-rewards-orientation and by differing attitudes to authority relationships in work. On entry, in all three fields of study, female students attached significantly less importance than male students to 'security' and somewhat less importance to 'good money' and 'status'. In all fields of study also, female students tended to look less for opportunities of exercising leadership, and except for the health sciences, to be less concerned about freedom from supervision.

After two years, as Table 3 shows, the overall differences between male and female students persisted although they were not quite as great as on entry.

Table 3: Occupational Values after Two Years

Value Variable	'Essential' or 'Of high importance'[1]			
	Males (N=342)[2]	Females (N=89)	χ^2 (df=2)	P<
Abilities	78.1	78.7	0.00	ns
Security	69.9	50.6	15.40	0.001
Creative	62.3	47.2	7.87	0.05
Helpful	45.9	57.3	4.64	ns
Good money	76.6	58.4	12.39	0.01
People	48.0	77.5	24.96	0.001
Leadership	55.2	24.7	35.16	0.001
Supervision	67.0	52.8	6.11	0.05
Status	24.6	14.6	11.11	0.01
Adventure	33.0	28.1	0.85	ns

1. 5-point scale.
2. Some students on industrial training at time of testing.

But, as Table 4 shows, within the fields of study some interesting changes had taken place. Over the two years the value placed by female students on the extrinsic rewards of work appeared to have increased appreciably. In all three fields of study, the concern shown by females for 'security', 'good money' and 'status' approached that shown by males. And, whereas on entry, valuation of extrinsic rewards was mainly a function of sex, after two years, it was linked primarily to field of study.

Table 4: Occupational Values after Two Years by Sex and Field of Study

Value Variable	'Essential' or 'Of high importance'					
	Arts and Social Science		Health Science		Applied Science	
	Male (N=66)	Female (N=47)	Male (N=44)	Female (N=23)	Male (N=93)	Female (N=16)
Abilities	80.3	76.6	77.3	73.9	75.3	87.5
Security	45.5[2]	34.0[3]	81.8	73.9	73.1	62.5
Creative	60.6	51.1	43.2	26.1	64.5[3]	56.3
Helpful	50.0	57.4	70.5[2]	65.2	50.5	43.8
Good money	53.0[2]	46.8	77.3	69.6	75.3	68.8
People	72.7	89.4[2]	56.8	65.2	36.6[2]	62.5
Leadership	42.4[1]	21.3	45.5	21.7	53.8	31.3
Supervision	69.7	53.2	77.3[1]	47.8	51.6[2]	56.3
Status	16.7	6.4[2]	31.8	34.8	21.5	37.5
Adventure	31.8	40.4[3]	18.2	8.7	30.1	25.0

1. Difference significant beyond 5 per cent level for comparisons within field of study by chi-squared (df=1).
2. Within sex difference significantly different from both other fields.
3. Within sex difference from significantly different from health scientists.

On people-orientation too, there appeared to be a change over two years, but in the reverse direction. Whereas, on entry, values within fields of study were similar, after two years, female applied scientists appeared to be more people-oriented than male applied scientists and as people-oriented as female health scientists. However, only 16 female applied scientists were involved and the difference from males does not reach an acceptable level of significance (χ^2=2.81, df=1; ns).

After two years, female students in all fields of study continued to attach less importance than males to exercising leadership, but in the social and applied sciences being free of supervision became almost as important to female students as males. In the health sciences, on the other hand, freedom from supervision became significantly more important to male students. In other respects, the similarities and differences noted on entry persisted after two years.

Discussion

The present study confirms previous research which suggests that sex status is an important determinant of occupational values. But where males and females have made similar choices - as with choice of subject at university - it shows that, with two exceptions, their values tend to be similar. The two important exceptions are, first, the lower weight generally given on entry by females to the extrinsic rewards of work and, second, the lower value placed by them on occupying positions of leadership. Both these differences are understandable in terms of the typical female role prescription in western culture. As traditionally defined this emphasizes the homemaking role vis-a-vis the occupational role and implies reliance on the occupational position of the male for money, security and status. The typical feminine role also tends to lay stress on being led rather than leading.

After two years at university the attitude of the female students towards the extrinsic rewards of work had grown closer to that of male students in the same fields. This process of convergence of beliefs within schools of studies has also been described by Cohen and Batcock (1969) and has been attributed by them to the influence of the prevailing male cultures. In the present context, it is likely that two years exposure to the hard, realistic environment of a northern technological university leads to an awareness that the extrinsic rewards of work are important even (perhaps especially) in the circumstances of an early marriage. The relative importance attached by males and females to ‘leadership’, the other value variable which produced consistent differences across the fields of study at the outset, did not change over two years.

On entry to university female students were more people-oriented than males. Again, this is understandable in terms of the typical feminine role prescription which emphasizes future family roles. This pronounced people-orientation was reflected in subject choice with only 3 females in an engineering intake of 279 compared to 54 out of 136 in arts and social sciences. Where, however, a female did choose science, at the time of choice, she was as likely to be non-people-oriented as her male counterpart. There is, however, some suggestion that over two years her attitude towards working with people changed away from that of her male colleagues towards that of other female students. In view of the small numbers involved it may be wrong to attach much importance to this observation, but if it is a real change, it represents an important exception to the ‘boundary of influence’ of subject areas in attitude and value changes discussed by Cohen and Batcock (1969).

In other respects the occupational values of males and females within the same subject area were similar at the outset and remained so over two years. This bears out theories of occupational choice which stress the importance of values. There were, however,

overall differences in occupational values which suggest that even in conditions of equal opportunity men and women will tend towards different occupations.

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Chapter 33: Open-Mindedness and the University Curriculum

Summary

An objective commonly ascribed to the university curriculum is the promotion of open-mindedness. A longitudinal study of dogmatism among students in the Boards of Engineering and Social Sciences indicates that changes in the desired direction do occur; all groups of students become significantly more open-minded over two years. Initially similar, female social scientists became significantly more open-minded than male social scientists, male technologists became somewhat more open-minded than male social scientists. Since students who withdrew from the University after one year also became significantly more open-minded, the changes that occurred may not be related to the content of the curriculum. Alternative explanations are considered.

Introduction

An objective commonly ascribed to the curriculum is the promotion of open-mindedness. Particular potency is often attributed to the humanities in this respect. The aim of humanities teaching in schools, for example, has been defined[1] as "the forwarding of understanding, discrimination and judgement in the human field." The effectiveness of the arts and social sciences is supposed to reside in the emphasis placed on educating the individual. More modest expectations are held of those disciplines where the emphasis is on meeting the needs of the community, but it is sometimes conceded that these too can provide a liberal education[2]. Nevertheless the new technological universities attach considerable importance to the provision of general studies courses in their applied curricula.

With the development of systematic methods of curriculum evaluation, it is possible to get some notion of the power of the curriculum to change behaviour. Early studies in America provided encouraging results. Summarizing these, Webster, Freedman and Heist[3] observed that the consensus appeared to be that student behaviour was changed in the direction of 'a more liberal attitude on social issues and a more tolerant attitude toward persons.' There was also evidence of a widening of interests. But, in l957, any tendency to complacency was dispelled by Jacob's book[4]. Collating the results of a number of post-war American studies he concluded that there were few significant changes in values during the college years. And those changes that did occur appeared to be in the direction of greater conformity to the prevailing value-pattern of American alumni. For the most part, instruction in a particular field of study did not seem to exert much influence on beliefs or judgements; liberal arts courses appeared to be no more effective than vocational specialisms.

Several more recent studies have challenged Jacob's main contentions. Plant[5], for example, has found that a college group became significantly less ethnocentric over two years compared to a matched group of dropouts. Also, students in their final year tend to be less ethnocentric than they were on entry[6]. But Plant[7] has also found that the college and dropout groups did not differ after four years. In agreement with Jacob, Brown and Bystryn[8] found that time spent at university had little bearing on changes in authoritarianism, but they did find some changes among minority groups in liberal arts colleges. In a recent study, Thompson[9] could detect few changes in student values.

According to Rokeach[10] authoritarianism is a particular aspect of the more general construct of dogmatism or closed-mindedness; He contends that authoritarianism scales are concerned exclusively with authoritarianism of the right and ignore belief systems of the left which are structurally similar. He has devised a scale comprised of items that "transcend specific ideological positions", which he claims, "is capable of measuring general authoritarianism and general intolerance." High scorers are said to be unreceptive to new ideas and inclined to confuse evidence and authority.

Lehmann and his colleagues[11] at Michigan State University have used Rokeach's scale in a longitudinal study of the attitudes and values of students. Early results did seem to show that change in the direction of open-mindedness was associated with college attendance, but when dropouts were followed-up they too were found to have changed similarly. Not all college experiences have been found to promote open-mindedness[12].

Although the personal development of college students has been extensively researched in America there have been comparatively few studies in this country. Some small scale studies have been carried out in colleges of education which show that the educational opinions of student teachers tend to change in the direction of radicalism, naturalism and tendermindedness during their courses[13]. (Tough-mindedness is a somewhat similar concept to authoritarianism.) But little is known of change among university students or of change in relation to particular fields of study. At the University of Bradford a longitudinal study is in progress. Among questionnaires administered to students in the Boards of Engineering and Social Sciences (excluding Business Studies) on entry was Rokeach's dogmatism scale. Two years later the same students were asked to complete the questionnaire again. This paper reports on levels of dogmatism among these students of engineering and social science on entry and examines the changes that occurred over two years.

Procedure

On entry to the University of Bradford in October 1966, 270 students of engineering and social science – 87 per cent of the intake - completed Rokeach's dogmatism questionnaire under examination conditions. Of these, 48 were females; 46 social scientists and 2 engineers.

Two years later in December 1968, when the questionnaire was mailed to the students, 115 or 48 per cent of those still at University completed the questionnaire again. In the meantime, 29 students had withdrawn (mostly at the end of the first year); 22 from engineering and 7 from social sciences. These, too, were followed-up and 8 replies - all from former engineers - were received.

Comparison of the 1966 scores of those students who responded again in 1968 and those who did not shows some tendency for the more open-minded to be more willing to respond - 155.2 ± 25.9 as against 159.1 ± 23.6 - but the difference is not significant ($t=1.24$, $P_{05}=1.96$). Dropout respondents showed a similar tendency to be the more open-minded - 152.3 ± 18.9 as against 161.0 ± 29.4 for the non-respondents - but again the difference is not significant ($t=0.76$, $P_{05}=2.05$).

Results

Table l presents the mean dogmatism scores of those students and former students who responded in both 1966 and 1968. On entry there were no significant differences. Students of the social sciences were just as closed-minded as students of engineering, female students as male students, and future dropouts as non-dropouts.

Table 1: Dogmatism Scores

Group	Sex	N	1966		1968		Mean Change	t	P<
			Mean	S.D.	Mean	S.D.			
Social Sciences	m	36	159.2	24.8	150.2	26.4	-9.0	2.21	0.05
Social Sciences	f	26	153.0	25.6	135.9[1]	23.3	-17.1	3.48	0.01
Engineering	m	53	153.6	26.4	141.8	22.2	-11.8	4.45	0.001
Engineering Dropouts	m	8	152.3	18.9	140.9	27.8	-11.4	2.65	0.05

1. Significantly different from male social scientists (P< 0.05).

All groups became significantly more open-minded over two years, the greatest change occurring among female students of social science. After two years they were significantly lower on dogmatism than male social scientists (t=2.2, P< 0.05). After two years there was also some tendency for male engineering students to be somewhat more open-minded than male social science students (t=1.57, P_{05}=1.96). Change among dropouts from the schools of engineering was similar to change among non-dropouts.

Discussion

Male social scientists at Bradford were not found to be less dogmatic than students of engineering either on entry or after two years in the University. This stands in marked contrast to the frequent finding[14] that students of the social sciences tend to be less authoritarian than students of engineering. Elsewhere, Child[15] has reported on the ideological characteristics of the present subjects as measured by the Eysenck Social Attitude Inventory[16]. He found that, in the main, students of engineering tended to be toughminded conservatives and social scientists, tenderminded radicals. Since toughminded conservatives closely resemble authoritarians as traditionally defined, these findings together provide support for Rokeach's contention that his scale is a measure of *general* authoritarianism.

In the present study, it was the students of engineering who were, if anything, less closed-minded on entry and the difference from male social scientists nearly reached statistical significance over two years. This suspicion of a difference may reflect the personality characteristics of the two groups. According to Rokeach dogmatism is a defence against anxiety and he[17] has shown the two variables to correlate highly. There is also evidence to suggest that anxiety may be a factor in resistance to change towards open-mindedness[18]. It seems fairly well established that students of science and technology tend to be lower on neuroticism than students of the arts and social sciences. Child[19] has shown this to be the case for the subjects of the present study.

The fact that students of both social science and engineering appear to change in the direction of open-mindedness suggests that both courses are effective in promoting

change. General studies forms an important element in the applied degree courses of the technological universities and it is conceivable that the growth towards open-mindedness on the part of the engineering students of the present study is to be attributed to this provision. More likely, however, the changes occurred independently of the curriculum. Jacob's work in this connexion has already been cited and his contention that the curriculum has little impact on students' values has been widely supported[20], even among those who dispute his other conclusions. Lehmann[21], for example, concluded on the basis of interviews with students at various stages of their courses that 'informal, non-academic experiences such as friends, persons dated, 'bull-sessions', and so forth have a greater impact upon personality development than do formal, academic experiences'. Relationships with staff may also be important. Johnson[22] has recently shown in America that change in dogmatism among a group of student teachers was a function of the degree of dogmatism of the supervising teachers. Even Jacob[23] conceded that 'some teachers do exert a profound influence on some students'.

The tendency for the female students in the present study to change more is consistent with much previous research[24]. It is well known that there are sex differences in conformity and persuasibility; females have consistently been found to be more conforming and more persuadable than males[25]. Whether this is due to some general persuasibility trait or some other factor is not clear at the present time. An explanation which has won wide appeal is that the difference is due to the prevalent sex roles. A typical feature of the feminine role is acceptance of the conventional values of a culture. Thus it may be that the greater change on the part of female students is socially determined. This could account for the paradox that female students although higher on neuroticism than males become less dogmatic while at university.

The absence of differences in open-mindedness between those students who withdrew from the University after one year and those who remained is consistent with the findings of Lehmann[26] and his co-workers. This may mean that the first year in university is particularly important. In support of this view, Lehmann *et al* showed that change in levels of dogmatism was not uniform from year to year in university, but took place more rapidly at first. An alternative explanation is that change towards open-mindedness is part of a process of maturation largely independent of the university environment. If this is the case, then the university years must coincide with a period of optimal open-mindedness; follow-up studies have generally shown[27] there to be a shift towards authoritarianism and tough-mindedness in the years after college. Follow-up studies will show what changes occur among the subjects of the present study.

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Chapter 35: Educational Values after Two Years

Summary

Students' educational values appear to be predominantly stable. After two years, as on entry, greater weight was given to intellectual goals; vocational preparation and social learning were also emphasized, but the development of a sense of responsibility, wide interests and an enthusiasm for life were not thought to be primarily the business of a university education. The importance attached to six objectives changed significantly over two years: self-knowledge was rated more important by students in all Boards of Studies; moral learning, fulfilment in work and certain intellectual objectives were given less weight. Initially similar, the values of social scientists and technologists tended to diverge, particularly in relation to vocational preparation and breadth of interests.

Introduction

Students probably come to university for a variety of reasons: to submit to the discipline of academic study; to prepare for future careers; to have an opportunity of thinking widely; or simply to have fun[10]. They will bring with them a variety of expectations about the purposes of a university. They may feel that it should emphasize learning for its own sake; that it should concentrate on vocational preparation and/or that it should emphasize some other objective such as the acquisition of social skills. We don't really know.

In this country there have been few systematic studies of students' educational values. American research suggests that to students vocational goals may be as, if not more, important than intellectual goals. Goldsen *et al*[2] in a nationwide survey found that about a third ranked vocational preparation as the most important objective and a similar proportion placed academic learning first. About a fifth stressed 'develop your ability to get along with all kinds of people', but moral development, training for citizenship and preparation for a happy family life were of secondary importance. Jervis and Congdon[3] in a study at the University of New Hampshire found that students ranked vocational preparation as the most important objective of a university education and in this they differed from staff who gave greatest weight to 'intellectual growth'. Jervis and Congdon found no difference between freshmen and senior students which suggests that educational values may be relatively unchanging. In other studies[2, 4], however, it has been found that vocational objectives decline in importance during the years in college.

Recently in this country the technological universities have been established with the avowed aim of providing an education related to industrial needs. Musgrove[6] has described the values held by students on entry to one of these universities. He found that the greatest weight was given to intellectual objectives and rather less to the development of social and vocational skills. In general, there was close correspondence between staff and student values although there was some tendency for students to place greater emphasis on the social and vocational relevance of their studies.

The survey described by Musgrove was carried out partly in order to establish a base-line for a longitudinal study. After two years the same students were approached again and asked to complete the same educational values questionnaire. This paper reports the results of that follow-up and analyses the changes that occurred.

Methods

The construction of the questionnaire used in this study has been described in detail by Musgrove[6]. Briefly, a selection of statements made by members of staff about the qualities which they aimed to foster in students were used to define fourteen possible aims of a university education. The fourteen sets of statements (unnamed) were presented in random order to the subjects who were asked to rate each set on a three-point scale. The three points on the scale were labelled 'essential' 'desirable, but not essential' and 'of little or no concern of a university education (although they may be desirable attributes of an individual).

Four hundred and thirty-four students completed the questionnaire in October 1966 and again in June l968. Of the original sample of 761 students, 85 had meanwhile withdrawn from the university and a further 123 (mostly engineers) were away in industry at the time of the second survey. Thus of the 553 students available for questioning a second time, 78.5 per cent again completed usable questionnaires. Comparison of the 1966 responses of those that responded again in 1968 with those that did not showed the 1968 sample to be representative of the whole intake.

In the analysis presented below the student categories are those used by Musgrove[6]. They are based on the four Boards of Studies of the University of Bradford.

Results

Table 1 shows that students' values are mainly stable. Intellectual values - 'independence of mind', 'understanding concepts', 'relating theory to practice' - were given greatest weight on entry and this continued to be so after two years. At the outset, developing 'a sense of responsibility' and 'an enthusiasm for life' were unimportant and this did not change. Developing wide intellectual interests continued to be de-emphasized by all except the social scientists.

Considering the intake as a whole, significant changes occurred on six values over two years. Of these only one - 'self-knowledge' - came to be rated more important. Greater weight was given to this value by students in all areas of study. Significantly less importance was attached to five values after two years. Of these, four - 'communication skills', 'depth of knowledge', 'fulfilment in work' and 'a sense of responsibility' – changed similarly in all sub-groups. In connection with 'relating theory to practice' change occurred particularly in students of engineering and social science. After two years, social science students attached significantly less importance to this value than did students in any other Board of Study.

Social scientists also came to differ from all fields of study in placing significantly more emphasis on the broadening of intellectual interests. They also attached less importance to vocational objectives. Significantly fewer social science than technology students after two years considered the understanding of human relations

in work essential. On entry, social scientists differed from all other groups in emphasizing the social relevance of study, but this declined in importance over two years. Students of engineering changed similarly.

Table 1: Educational Values by Board of Study: Initially (A) and after Two Years (B)[1]

Value	% 'Essential'							
	Engineering (N=106)		Physical Sciences (N=124)		Life Sciences (N=71)		Social Sciences (N=133)	
	A	B	A	B	A	B	A	B
Social skills	43.4	41.5	43.5	37.1	*46.4	32.4	41.3	39.1
Independence of mind	93.4	94.4	90.4	90.4	91.6	87.4	95.5	94.9
Self-knowledge	42.4	46.4	33.9	44.3	36.6	50.8	33.1	39.8
Communication skills	*55.6	42.5	44.4	36.3	**e**38.0	32.4	48.9	42.1
Moral	**28.3	13.2	**28.2	15.4	**33.8	14.1	***16.7***	8.3
Vocational (A)	52.8	62.2	56.4	60.5	46.4	46.4	43.6	35.3**e,p**
Social relevance	*49.0	36.8	46.8	50.0	40.9	45.1	****70.7***	57.8[e]
Relates theory to practice	* **p,s** 95.2	84.0	84.5	87.1	87.3	81.8	**79.9	***63.1***
Understands human relations in work	51.9	45.3	*41.9	53.2	***18.3***	16.9 **e,p**	**48.1	301**e,p**
Understands concepts	85.8	84.9	83.9	86.2	94.4	93.0	**l**80.5	78.9**l**
Personal fulfilment	17.0	18.9	12.9	9.7	16.9	7.0**e**	9.0	11.3
Depth of knowledge	47.3	41.5	**58.0	44.3	*56.3	40.9	54.8	45.8
Wide intellectual interests	16.3	17.0	23.8	17.7	26.8	15.5	*23.3	***32.3***
Fulfilment in work	*67.0	53.8	**67.7	52.5	60.5	52.1	*60.9	45.1

1. Significance of change between A and B computed by McNemar's method (see reference 5), the probabilities designated by * P< 0.05, ** P< 0.01, *** P< 0.001.
2. Significant differences (chi-squared, P< 0.05) between areas of study either initially (columns A) or after two years (Columns B): different from all other groups signified by being in bold and italics; different from engineering students signified by **e**; different from physical science students signified by **p**; different from life scientists signified by **l**; different from social scientists signified by **s**.

The rankings of the 14 values by staff in 1966 and by students in 1966 and 1968 are presented in Table 2. The close correspondence of staff and student values, noted by Musgrove[6], persisted after two years. But there was no general tendency for students to move closer to the average staff positions. They did in placing greater emphasis on 'self-knowledge' and less on 'fulfilment in work' students in all areas of study moved closer to staff values; in placing less on 'communication skills' they moved further away. Students in all four Boards of Studies continued to give greater weight than staff to the acquisition of social skills; vocationally relevant study continued to be emphasized more by technological students than their staff.

Table 2: Rankings by Staff (S) and Students Initially (A) and Students after Two Years (B)

Value	Engineering			Physical Sciences			Life Sciences			Social Sciences		
	S	A	B	S	A	B	S	A	B	S	A	B
Independence of mind	1	2	1	1	1	1	2	2	2	1	1	1
Relates theory to practice	3	1	3	2	2	2	3	3	3	3	2	3
Understands concepts	2	3	2	3	3	2	1	1	1	2	3	2
Fulfilment in work	9	4	5	9	4	8	11	4	5	10	6	8
Social relevance	10	7	11	8	8	6	7	8	5	4	4	4
Vocational relevance	7	5	4	6	5	4	5	7	4	12	10	12
Depth of knowledge	6	10	8	5	6	7	6	5	8	5	5	5
Social skills	11	9	7	11	7	9	13	6	9	11	9	6
Communication skills	4	6	10	4	10	11	4	9	10	6	7	7
Understands human relations in work	5	8	9	10	9	5	10	13	11	9	8	11
Self-knowledge	8	11	5	7	12	10	9	11	7	7	11	9
Wide intellectual interests	13	13	12	13	11	12	12	10	11	8	12	10
Moral	12	12	13	12	13	13	8	12	13	13	13	14
Personal fulfilment	14	14	14	14	14	14	14	14	14	14	14	13
Rho between S and A		0.81			0.76			0.64			0.87	
Rho between S and B		0.77			0.77			0.72			0.92	

Discussion

Students come to university to pursue intellectual goals Vocational preparation and the acquisition of social skills are also important, but the development of moral capacities, wide interests and an enthusiasm for life appear to be relatively unimportant. These findings amongst one intake of students into a British technological university are closely similar to those of the Cornell Study of Values[2].

Musgrove[8] has recently described processes of convergence and divergence in students' conceptions of the ideal university: convergence on central academic goals and divergence between students in different fields of study. Initially similar, after two years social science students and technology students came to give different weights to vocational and cultural university attributes. Similar differences emerge when objectives are defined in terms of the characteristics of graduates. In the present study (carried out amongst the same students as Musgrove's) social science students came to place more emphasis than technology students on widening of interests and less on vocational preparedness. The central academic concern of students is reflected in the continued considerable emphasis placed on achieving understanding and developing independence of mind.

The importance attached to six objectives changed significantly over two years. Secondary objectives like moral development and communication skills were further de-emphasized and less weight was also given to learning how to *enjoy* a future career. Depth of knowledge in a particular field and the relevance of theory to practice declined in importance amongst students in some fields of study. Particularly

interesting is the increased emphasis placed on self-knowledge; on understanding strengths and weaknesses and how to use them. This is very much in accord with Musgrove's[7] recent analysis of curriculum objectives: "the curriculum teaches a pupil the kind of person he is, it shapes his conception of himself". "A modern curriculum can provide the opportunities for extensive self-exploration and for accurate self-evaluation".

By analogy with models of attitude change, it is to be expected that changes in values will in part reflect students' experiences. Whether the increased weight given to self-knowledge reflects the challenge or the shortcomings of present university curricula awaits further study. Staff values do not appear to be an important factor in promoting change in student values. Similar at the outset, there was no general tendency for staff and student values to either converge or diverge over two years. Comparable findings in America have been reported by Jervis and Congdon[3]. Conflict in staff-student values has recently been offered as one explanation of the apparent malaise of students[1]. Unlike staff, students are said to see education increasingly in utilitarian terms. The results of the present inquiry do not lend support to this view. Although concerned that their knowledge should be applicable, Bradford students were also very conscious of the effects of learning upon themselves. Above all they wished to achieve understanding and develop independence of thought. They are very much in the tradition of Newman[9].

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Chapter 37: Some Factors in Lecturing

Summary

Four hundred and thirty-one second-year students rated 50 possible characteristics of the ideal lecturer. Responses were inter-correlated and factor analysed by the Varimax procedure. Twelve factors isolated in this way were interpreted as questions which students ask themselves in evaluating lecturers. Students in all fields of study were agreed that the ideal lecturer is an authority in the subject, can expound it clearly and thoroughly prepares, gives them an obvious framework and is ready to respond to questions. On other aspects, there were differences in emphasis according to field of study: students of applied science and engineering appeared to look towards lecturers for information, social scientists, for stimulation. Other differences suggest that teaching and lecturing abilities may be more specific than is commonly supposed. This must be recognised in any attempt to train lecturers.

Introduction

Complaint against the quality of University lecturing is so frequent as to have almost become a cliché. What is wrong from the students' point of view appears to be well known in the junior common rooms. But it is only recently, with the publication of the reports of the National Board for Prices and Incomes (1968) and National Union of Students (1969) that the possibility of universities making use of this knowledge has been taken at all seriously.

Apart from the interest of a few individuals (e.g. Gauvain, 1968; McVey, 1968; Foy, 1969) little has been attempted in this country by way of finding out how students rate their experiences. In America, on the other hand, it is fairly common for the universities, particularly the major universities, to conduct an annual survey of student opinion on courses and teaching (cf. the 'Muscatine Report', 1966). At the University of Michigan, for example, students are asked what course objectives the lecturer appears to be emphasizing, whether they are satisfied with these objectives, how they rate the quality of the teaching and so on. Responses are confidential to individual lecturers.

A corollary of this involvement of students in the 'quality control' of teaching is that evidence is available concerning the American students' conception of the good lecturer. As is to be expected, conceptions vary with university (Pogue, 1967), field of study (Musella and Rusch, 1968) and various student characteristics (Stern, 1962 Spaights, 1967). But it seems generally agreed that whatever else he may possess, the good lecturer has to have expert knowledge of his subject and the ability to expound it clearly. Whether the lecturer has a pleasing personality, a sympathetic attitude to students, or even a good speaking voice, appear to be of secondary importance.

This emphasis on expertise and lucidity also emerges in British studies. Marris (1964) in research on students of three universities and what was then a college of advanced technology found that students attached greatest importance to a lecturer knowing his subject and presenting it so that his audience can understand it. In Cooper and Foy's (1967) study, 'presents his material clearly and logically' was rated the most important of 43 possible lecturer-characteristics. According to Musgrove and Taylor (1969), this

instrumental, intellectual emphasis is "broadly true for all stages of education from the infants' school to the university".

At the University of Bradford, as part of the developmental work for a lecturer rating form, a survey has been carried out among students to find out what they want from their lecturers. The participants in the survey are also the subjects of a longitudinal study. From the information thus available it will be possible to examine the correlates of students' expectations. In this first paper, an attempt is made to pick out some of the criteria by which lecturer behaviour is judged and to discover whether expectations are consistent across the different fields of study.

Methods

Statements about lecturer behaviour were collected from a variety of sources: interviews were conducted with 24 science students; note was taken of previous research in this area (e.g. Cosgrove, 1959; Cooper and Foy, 1967); and a number of items were derived from the literature, particularly Marris's (1964) book. A pool of 67 items was assembled, but elimination of the more obvious duplicates and vague items (e.g. 'has a democratic approach') reduced the list to 50. This is given in full as an appendix.

Following Cooper and Foy (1967), all statements were positively worded. Students were asked to indicate on a seven-point scale what a lecturer in their main subject would have to be like to be considered ideal. The scale ranged from (1) 'essential' through (4) 'of little or no importance, or irrelevant' to (7) 'extremely undesirable'.

Four hundred and thirty-one students completed the questionnaire towards the end of their second year in the University. Respondents comprised 79 per cent of the intake available at the time of the survey (some students were out in industry). Comparison of respondents and non-respondents on a number of other measures indicated the respondents to be representative of the whole entry.

The responses of the 431 students on the 50 items were inter-correlated and subjected to a principal components analysis. Fourteen factors which satisfied Kaiser's criterion (an eigenvalue greater than one) accounting for 64.7 per cent of the variance were identified. The first twelve factors (the limit of the capacity of the programme available) were rotated by a Varimax procedure.

Results

The rotation solution can be seen to embody the basic questions which students ask themselves in evaluating their lecturers. Possible formulations of these questions are given below together with statements on which the factors were loaded to the extent of 0.3 or more:

(1) Is the subject matter balanced and set in its appropriate context?

(a) Points out links between his and related subjects (0.62)
(b) Refers to recent advances in his subject (0.54)
(c) Tries to link lecture material to laboratory/practical/ field work (0.51)
(d) Gives a good factual coverage of the field of study (0.49)

(e) Explores ideas which are not already in the textbooks (0.59)
(f) Presents all sides of a controversial matter non-committally in an objective light (0.58)
(g) Tries to synthesize the different points of view which may exist on a given topic (0.55)
(h) Illuminates the basic principles of the subject (0.52)
(i) Refers to examples and illustration from his own experience (0.50)
(j) Helps students to see the social implications of the subject (0.50)

(2) How useful are the lectures likely to be in terms of the examinations?

(a) Reads out concise notes relevant to the exams (0.64)
(b) Speaks slowly enough for full notes to be taken (0.58)
(c) Provides all you need to know for passing the exams (0.57)
(d) Adequately covers the ground in the lecture course (0.56)
(e) Is rigorously accurate when presenting facts (0 39)
(f) Organises his blackboard work clearly (0.35)
(g) Provides duplicated notes summarizing the content of the lecture (0.34)
(h) Gives good factual coverage of the field of study (0.33)
(i) Thoroughly prepares his lectures (0.32)
(j) Sticks closely to carefully prepared lecture notes (0.31)

(3) Does the lecturer appear to be on top of the job?

(a) Appears to enjoy lecturing (0.68)
(b) Appears to like students (0.63)
(c) Is entertaining (0.53)
(d) Appears confident and at ease in lecturing (0.51)
(e) Can make his subject interesting to the audience (0.41)
(f) Is original (0.36)
(g) Uses appropriate illustrative aids such as slides, films, etc. (0.34)

(4) Does the lecturer stimulate you to pursue his subject further?

(a) Leaves room for students to exercise their imaginations (0.56)
(b) Stimulates students to think independently (0.51)
(c) Concentrates on providing the essentials of the subject as a framework for independent study (0.49)
(d) Explores ideas which are not already in the textbooks (0.45)
(e) Makes his subject seem intellectually exciting (0.30)

(5) How good is the lecturer's basic technique?

(a) Organises his blackboard work clearly (0.55)
(b) Writes legibly on the blackboard (0.54)
(c) Can be clearly heard (0.40)
(d) Is rigorously accurate when presenting facts (0.33)

(e) Uses appropriate illustrative aids such as slides, films, etc. (0.31)

(6) Is the lecturer well-informed and well prepared?

(a) Is well-informed around his special subject (0.52)

(b) Thoroughly prepares his lectures (0.50)

(7) Is the lecturer's presentation personal?

(a) Avoids distracting personal mannerisms (0.47)

(b) Talks freely around a few brief notes (0.42)

(c) Projects his own interest in the subject (0.39)

(d) Takes his own distinctive line on a controversial matter or where a problem has yet to be resolved (0.32)

(8) How closely does the lecturer keep to his notes and what is their relation to the textbooks?

(a) Keeps strictly to the textbooks (0.50)

(b) Sticks closely to carefully prepared lecture notes (0.50)

(c) Keeps to the point (0.33)

(9) How does the lecturer respond to questions?

(a) Is open to questions (0.44)

(b) Is able to accept challenges to his interpretations (0.37)

(10) Is the lecturer an authority in the sense that he has a mastery of his subject and can expound it clearly?

(a) Presents his subject so that students can understand it (0.47)

(b) Knows his subject (0.45)

(c) Shows the practical relevance of his subject (0.37)

(d) Illuminates the basic principles of the subject (0.34)

(e) Is able to accept challenges to his interpretations (0.30)

(f) Indicates where relevant information not dealt with in the lecture can be found (0.30)

(11) What guidance does the lecturer give for following up his lectures?

(a) Indicates where relevant information not dealt with in the lecture can be found (0.40)

(12) Does the lecture course have an obvious structure?

(a) Presents his material clearly and logically (0.42)

(b) Maintains continuity in a course of lectures (0.32)

Table 1: Expectations by Field of Study

Ideal Lecturer	% 'Essential' or 'Desirable' Engineering (N=105)	Phys Sciences (N=122)	Life Sciences (N=71)	Arts &Soc Sci (N=133)
Points out links between his and related subjects	58.6	71.3	60.6	63.2
Refers to recent advances in his subject	79.9	79.4	93.1	77.2
Provides all you need to know for passing the exams	88.6	79.5	81.9	53.4
Speaks slowly enough for full notes to be taken	87.5	65.6*$	81.9	61.6*$
Appears to enjoy lecturing	78.0	61.5*$	82.0	66.1*$
Appears to like students	76.2	61.5*	70.2	57.2*+
Leaves room for students to exercise their imaginations	61.8	67.1	74.9	81.8*
Provides a framework for independent study	45.7	55.7	70.4*	81.2*
Writes legibly on the blackboard	88.5	81.2	74.9	54.1
Uses appropriate illustrative aids such as slides, films etc.	45.7	35.2	63.4	23.3
Is well-informed around his special subject	85.6	86.1	84.8	86.0
Thoroughly prepares his lectures	95.2	88.2	94.3	85.0
Talks freely around a few brief notes	19.1	24.8	26.8	35.3*
Takes his own distinctive line on a controversial or contested matters	20.2	38.5*	36.6	47.4*
Keeps strictly to the textbooks	4.8	4.9	9.8	0.8
Sticks closely to carefully prepared lecture notes	26.6	18.1	28.2	15.1
Is open to questions	91.4	95.0	89.0	91.7
Is able to accept challenges to his interpretations	82.9	87.8	77.8	88.0
Knows his subject	99.0	96.1	100.0	94.1
Presents his subject so that students can understand it	100.0	99.2	98.7	96.1
Indicates where additional information can be found	80.9	90.0	88.8	92.3*
Presents his material clearly and logically	97.0	91.1	94.3	91.9
Maintains continuity in a course of lectures	92.4	72.1	93.0	77.2

Statistically significant differences (χ^2; P< 0.05): from all other groups underlined; from engineers *; from physical scientists +; from life scientists $.

The importance attached by students grouped by Board of Studies to each aspect of lecturer-behaviour is shown in Table l. All four Boards attached high importance to lecturers being an authority in their subject, thoroughly preparing lectures, organising an orderly presentation and showing how the lectures could be followed up. Keeping to the textbooks or sticking closely to lecture notes were rejected by most students.

On other points, differences in emphasis emerged. Individualistic approaches had more appeal to students of arts and social science than to technologists. Students in the Board of Social Sciences also differed in other ways. They attached significantly less weight than other students to the relevance of lectures to the exams and like the physical scientists they were less concerned about obtaining a full set of notes than students of engineering and life sciences. Among all groups of students fairly low priority was given to the provision of duplicated lecture notes. (Less than half the students thought these essential or desirable, and overall the item was ranked forty-fourth out of 50 items).

Students of arts and social science attached significantly less importance than other groups of students to the lecturer being able to write legibly on the blackboard and to the use of slides, films and so on. This last provision was especially important to life scientists who also attached particular importance to hearing about recent advances in their subjects. Students of engineering attached more importance than physical and social scientists to the lecturer appearing to enjoy himself.

Discussion

To borrow a phrase from Musgrove and Taylor (1969): "students expect a lecturer to be able to lecture." In particular, they look for expertise and lucidity. They also want lecturers to thoroughly prepare their lectures, to give them an obvious structure and to respond to questions. What they do not want is someone who has nothing to add to the textbooks or who stands before them merely reading notes.

Although students in all fields of study were agreed on some aspects of the good lecturer, there were also differences in emphasis. Broadly speaking, students of the arts and social sciences appear to look towards their lecturers for stimulation and enthusiasm, students of engineering and applied science, for information.

There were other differences between the groups of students which are perhaps attributable to the subject matter. The life sciences are developing rapidly at the present time with recent findings giving detail and clarity to areas previously vague and confusing. Thus it is particularly important to hear about recent developments in these fields. The life sciences also involve considerable study of structure which makes slides, films and other illustrative material an indispensable aid in many cases.

Other writers both in America and in this country have noted specificity in students' expectations. Musella and Rusch (1968) found that, while students in all fields emphasized 'expert knowledge of subject', science students tended to prioritise 'systematic organisation of the subject matter', whereas for arts and social science students uppermost was 'ability to encourage independent thought'. Marris (1964) has reported that arts students attached more importance to 'originality' and less to 'a good set of notes' than science students.

Good teaching thus appears to mean different things according to field of study. It may be that there is no such thing as general teaching ability, but rather specific skills related to particular subjects. Different skills are also likely to be required in teaching at different levels. Thus the good physics lecturer faced with a group of social scientists in general studies may be a poor lecturer; the schoolmaster may be ineffective as a university lecturer. This has important implications for the training of lecturers.

Students' goals will also influence their expectations of lecturers. The point of being at university for most students is to get a degree, which means passing examinations of a particular type. It is to be expected that many students will view lectures in utilitarian terms, and, in fact, about four-fifths of the applied science and engineering students in the present study thought that lecturers should provide 'all you need to know for passing the exams'.

The factor analysis draws out the core criteria by which students assess the quality of what they are being offered. Suitably phrased these could form the basis of a questionnaire by which lecturers could obtain feedback on how they were doing. It is clearly important to the lecturer to know that the lectures are getting across - if he is generating enthusiasm, or if some weakness in technique is getting in the way. On the other hand, the utility of the lectures to the exams is very important to students, lecturers are not likely to want to be judged on the degree to which they spoon-fed students.

The message of this paper is, however, that students' evaluations of lecturers probably cannot be usefully considered except in relation to their expectations.

Acknowledgement

The author is grateful for the advice and encouragement of Professor F. Musgrove.

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Appendix: Rank Order of Expectations of the Ideal Lecturer

1. Presents his subject so that students can understand it.
2. Knows his subject.
3. Can make his subject interesting to the audience.
4. Can be clearly heard.
5. Presents his material clearly and logically.
6. Is open to questions.

7= Is well-informed around his special subject.

7= Thoroughly prepares his lectures.

9. Adequately covers the ground in the lecture course.
10. Stimulates students to think independently.
11. Indicates where relevant information not dealt with in the lecture can be found.
12. Maintains continuity in a course of lectures.
13. Is able to accept challenges to his interpretations.
14. Illuminates the basic principles of the subject.
15. Appears confident and at ease in lecturing.
16. Tries to link lecture material to laboratory/practical/field work.
17. Refers to recent advances in his subject.
18. Writes legibly on the blackboard.
19. Provides all you need to know for passing exams.
20. Gives a good factual coverage of the field of study.
21. Is rigorously accurate when presenting facts.
22. Shows the practical relevance of his subject.

23= Sets clear objectives for the student.

23= Makes his subject seem intellectually exciting.

25. Explores ideas which are not already in the textbooks.

26. Speaks slowly enough for full notes to be taken.
27. Appears to enjoy lecturing.
28. Leaves room for students to exercise their imaginations.
29. Keeps to the point.
30. Tries to synthesize the different points of view which may exist on a given topic.
31. Sets a standard of learning which the student can aim to achieve.
32. Projects his own interest in the subject.
33. Concentrates on providing the essentials of the subject as a framework for independent study.
34. Appears to like students.
35. Organises his blackboard work clearly.
36. Points out link between his and related subjects.
37. Presents all sides of a controversial matter non-committally in an objective light.
38. Refers to examples and illustrations from his own experience.
39. Is entertaining.
40. Helps students to see the social implications of the subject.

41= Reads out concise notes relevant to passing the exams.

41= Has a good vocabulary.

43. Is original.
44. Provides duplicated notes summarizing the content of the lecture.
45. Uses appropriate illustrative aids such as slides, films etc.
46. Takes his own distinctive line on a controversial matter or where a problem has yet to be resolved.
47. Avoids distracting personal mannerisms.
48. Talks freely around a few brief notes.
49. Sticks closely to carefully prepared lecture notes.
50. Keeps strictly to the textbooks.

Chapter 39: Individual Differences in Expectations of Lecturers

Summary

Students' expectations of lecturers have been related to personality characteristics. Extraverts attached more importance to the lecture as a performance than did introverts; students high on neuroticism, particularly neurotic-introverts emphasized utilitarian aspects of lectures; and dogmatic students wanted lecturers who set clear goals and kept to the point. But overall the differences were few and relatively small. Students' personality type is not likely to be a major factor in the evaluation of lecturers.

Introduction

Ever since the National Board for Prices and Incomes report[1] in 1968 on assessment of university staff by students, it has been a hotly debated issue. Various quasi-official groups[2] have thrown in their lot with the NBPI, at least so far as supporting the principle of student evaluation. Apparently successful precedents[3] in America and Australia have been cited and lecturers with experience of feedback procedures have attested to their value[4]. But the general reaction of academics, perhaps not unexpectedly, has been one of hurt surprise. But, beyond the inclination to reject unfamiliar ideas, a number of important objections have been raised.

Among these is the problem of variation in the standards by which students hold lecturers hold students to account. It can be argued that, for a variety of reasons, different students will expect different things of their lecturers and judge them accordingly. American research has indicated that there are systematic differences in students' conceptions of the good lecturer. Expectations have been found to vary with university[6], field of study[7], years at university[8] and various student characteristics such as achievement level[9] and personality[10]. But Rayder[11] has concluded from a study of the ratings of 87 staff by some 4,200 students that, in general, student ratings are more a reflection of the university teacher's characteristics than of those doing the ratings. In this country, Foy[12] has shown recently that two student groups at similar stages of the same course agreed closely in their conceptions of the ideal lecturer and in their assessments of an actual lecturer.

Methods

It is possible to examine the question of variation in student standards further by drawing on data available from a long-term study of students entering the University of Bradford. Data from the study have already been used to show that good teaching appears to mean different things according to field of study[13]. Over 93 per cent of students entering the University of Bradford for the first time in 1966 provided information about themselves on a variety of tests, inventories and questionnaires. Early in the third term of their second year in the University the same students were asked to complete a further battery of measures. Included in this second survey was a lecturer characteristics questionnaire[14] comprising 50 items. Students were asked to rate each item on a seven-point scale to indicate what a lecturer in their main subject would have to be like before he could be considered ideal. Four hundred and thirty-one students or 79 per cent of those available for testing (some were away on industrial

training) responded. Of these, 89 were female and, to control for variation with sex, they have been excluded from the present study.

Included in the battery of tests administered at the outset was the well-known Eysenck Personality Inventory[15]. Following Furneaux[16], four personality groups were established by dichotomising the neuroticism and extraversion distributions at their means (for the male intake) and combining the two classifications. Individuals who responded to the lecturer characteristics schedule were then assigned to one of the four categories: neurotic-introvert, neurotic-extravert, stable-introvert and stable-extravert. The four quadrants were then matched for field of study by random elimination. Analysis of the results showed that in only a very few instances were there indications of interaction between the neuroticism and extraversion dimensions. Usually, therefore, in presenting the results, categories have been recombined to give independent high and low scoring groups on the two dimensions.

Also included in the 1966 test battery was Rokeach s dogmatism scale[17]. This is designed as a measure of general authoritarianism and evidence is available that it identifies authoritarianism of the Left as well as of the Right[18]. High scorers on the scale are said to have difficulty in evaluating evidence independent of its source. High and low dogmatic groups were established in the present study by taking scores beyond 0.75 standard deviations of the mean in either direction.

Results

Very few individual differences in expectations of lecturers were found to be related to personality. Differences according to scores on the Eysenck Personality Inventory occurred on only 10, and on Rokeach's dogmatism scale on only 8 out of the 50 items. The rank orders of expectations of the different personality groups were closely similar to the overall rank order of expectations previously reported[19]. All groups of students attached greatest importance to the lecturer knowing his subject and being able to expound it lucidly. They also attached high importance to lectures being given an obvious structure and being set in an appropriate context. Approachability was also highly valued.

Elsewhere there were differences in emphasis. Table l shows that, although the differences are slight, extraverts tended to attach more importance to the lecture as a performance than did introverts and, for extraverts, the ideal lecturer is entertaining, confident and at ease. In fact, very much how the typical extravert sees himself.

Table 1: Different Emphases of Extraverts and Introverts

Ideal Lecturer	% 'Essential' or 'Desirable'		χ^2	P<
	Extraverts (N=68)	Introverts (N=68)	(df=1)	
Is entertaining	70.6	53.0	4.51	0.05
Appears confident and at ease	86.8	69.1	5.17	0.05

Differences between students with high or low scores on the neuroticism scale were associated more with lecture content than its entertainment value. Table 2 shows that students with high scores, as might be guessed from their predisposition to anxiety, wanted the lecturer to set a standard and to give them a point of view. They were not

as concerned as other students with being stimulated, but they did want a full set of notes.

Table 2: Different Emphases According to Level of Neuroticism

Ideal Lecturer	% 'Essential' or 'Desirable' High (N=68)	Low (N=68)	χ^2 (df=1)	P<
Stimulates students to think independently	82.4	97.0	6.45	0.02
Speaks slowly enough for full notes to be taken	79.4	64.6	3.58	0.10
Presents all sides of a controversial matter non-committally	50.0	67.6	4.37	0.05
Sets a standard of learning which students can aim to achieve	73.5	55.9	4.64	0.05

This utilitarian emphasis is particularly evident among neurotic-introverts who as Table 3 shows were disinclined toward individualistic lecturers who aim to prompt students to work out things for themselves. What they did want was a good set of notes relevant to the exams. There is evidence[20] to suggest that neurotic-introverts tend to be more successful in examinations than other students and this is usually attributed to the relative ease with which they enter states of 'high drive'[21]. The present data suggest that students of this personality type may also tend to succeed because they keep examinations uppermost in their minds.

Table 3: Different Emphases by Neurotic Introverts and Other Students

Ideal Lecturer	% 'Essential' or 'Desirable' Neurotic Introverts (N=34)	Other Students (N=102)	χ^2 (df=1)	P<
Reads out concise notes relevant to the exams	70.6	43.6	5.66	0.02
Leaves room for students to exercise their imaginations	53.0	79.2	7.01	0.01
Takes his own distinctive line on a controversial matter	23.5	47.6	4.89	0.05
Explores ideas which are not already in the textbooks	58.8	77.2	3.12	0.10

The construct of dogmatism overlaps with neuroticism. According to Rokeach[22] dogmatism is a defence against anxiety. Attempts to ward off worry result in closed-minded behaviour is manifested as belief in positive and negative authority, difficulty in receiving new ideas and a tendency to perceive a good deal of irrelevance in what other people say. All of these characteristics emerge in the dogmatic's expectations of lecturers. Table 4 shows that he wants them to set clear goals, keep to the point and use whatever aids are necessary to put it across. There is evidence which shows that dogmatics tend to have a stronger preference for the lecture method than do other students[23]. The present data suggest that they also have higher expectations of lecturers.

Table 4: Different Emphases According to Level of Dogmatism

Ideal Lecturer	% 'Essential' or 'Desirable' High Dogmatism (N=47)	Low Dogmatism (N=47)	χ^2 (df=1)	P
Sets clear objectives for the student	85.0	63.8	5.59	0.02
Sets a standard of learning which students can aim to achieve	83.0	51.1	9.43	0.01
Keeps to the point	76.6	57.5	3.90	0.05
Thoroughly prepares his lectures	93.5	76.6	4.11	0.05
Uses appropriate illustrative aids such as slides, films etc.	48.9	25.5	5.51	0.02
Provides duplicated notes summarizing the content of the lecture	57.4	38.3	3.85	0.05
Organises his blackboard work clearly	70.2	48.9	4.41	0.05
Tries to link lecture material to laboratory/practical/field work	91.5	63.8	8.83	0.01

Discussion

Although students' conceptions of the ideal lecturer do vary with personality as shown in Tables 1-4, the differences are comparatively few and relatively slight. On the whole, students of different personality types tend to judge the quality of lectures using similar criteria. Taken together with the work of Rayder[24] and Foy[25], this suggests that rating scales would be a technically sound method of assessing lecturer performance. Whether, in fact, it is desirable that university teachers should be evaluated by students in this way is another matter.

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