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EXPERIENCE OF BUREAUCRACY AND ATTITUDES TO INDUSTRIAL TRAINING

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Changes in attitude to industrial training which occurred among eighty-four engineering students in the University of Bradford were related to organizational characteristics of the training situation The more favourable attitudes were found among students whose experience of bureaucracy was mild Those who improved in their attitudes over a period of six months in industry were likely to have had more extensive contact with senior technical personnel and to have enjoyed a relatively protracted 'time span of discretion' in their work There were indications that after their six months in industry the students were more likely to value tact and social skills but they were also more likely to claim the importance of indepen dence of thought and opinion They saw the organizations in which they worked as requiring tolerance, willingness and co operation, but also informality and a questioning mind

The degree course for engineering students in the University of Bradford extends over four years Periods in the university alternate with periods in industry to form a 'sandwich course' Students enter industry for six-month periods of training to see the practical applications of their learning and to be exposed to the scientific problems and practices of advanced industrial concerns They also gain insight into the problems of human relationships and organization which are inseparable from the conduct of large-scale scientific and technological enterprise The nature of the organization of human relationships in the firms to which they go will, in turn, influence the students' opportunities for learning and attitudes to industrial training

The industrial bureaucracies in which students obtain their training are, in varying degrees, centralized and formalized A highly centralized bureaucracy will assign tasks to its members but will not allow them to carry out these tasks without frequent reference to superiors In addition, staff members will have little share in the setting of goals and policies for the organization These two aspects of centralization may be referred to as the degree of hierarchy of authority and the degree of participation in decision-making A highly formalized organization will standardize work practices and allow little deviation from official procedures There will be close and detailed specification of how work should be done, and insistence on the observation of rules These two aspects of formalization may be referred to as the degree of job codification and the degree of

rule observation or enforcement These bureaucratic features of formal organizations have been examined by industrial sociologists for their bearing on productivity and the sense of alienation of employees from their work This paper reports an inquiry into the influence of bureaucracy on the attitudes to industrial training of engineering students who entered the University of Bradford in 1966

METHOD AND PROCEDURE

Six attitude or rating scales were used in this inquiry A Likert scale of attitude to industrial training was constructed, and five rating scales designed to reveal the bureaucratic characteristics of the industrial organizations in which the students were placed

(i) Statements for the scale of attitude to industrial training were derived from interviews with a random sample of twenty-four students who had experienced industrial training These students were asked what they had found valuable in their industrial training periods, what they had found of little or no value, what they had liked, and what they had disliked Forty statements were taken from their 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 again a fortnight later the test-retest reliability coefficient was 0 87) After item analysis, eight 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 'During my time in industry I was simply a form of cheap labour' was recast as 'During my period in industry I expect I shall simply be a form of cheap labour' 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 with the scores of a twenty-five per cent stratified random sample (N 122)

(ii) An experience of-bureaucracy scale was constructed from the four organizational indices of Aiken and Hage (1) Subjects were required to indicate on a five-point scale their degree of agreement with the following fourteen statements as they applied to their work situation (The headings were omitted)

(*Hierarchy of authority*)

1 There could be little action taken until a supervisor approved

2 A person who wanted to make his own decisions would be quickly discouraged

3 Even small matters had to be referred to someone higher up for a final answer

4 Any decisions I made had to have my superior's approval

5 I had to ask my superior before I could do almost anything

(*Participation in decision-making*)

6 I had some share in decisions about new practices

7 I had a part in decisions about new programmes of work

(*Job codification*)

8 I felt I was my own boss on most matters

9 A person could make his own decisions without checking with anyone else

10 How things were done was left to the person doing the work

11 People were allowed to do almost as they pleased

12 Most persons made their own rules on the job

(*Rule observation*)

13 Employees were constantly being checked on for infringement of rules

14 People were being constantly watched to see they obeyed all the rules

(iii) A coarse measure of the 'time-span of discretion' (2) was obtained by asking students how often their work was checked by the person to whom they were responsible 1, every hour or less, 2, once a day, 3, once every two or three days, 4, once a week, 5, less frequently than once a week

(iv) In order to assess change in the importance attached by students to intellectual and social conformity, a further questionnaire asked subjects to rank six attributes of a university graduate in order of importance One attribute indicated intellectual conformity or nonconformity ('prepared politely but firmly to disagree with the views of his superiors on scientific, technical or professional matters, if he thinks they are wrong'), and another indicated social conformity or nonconformity ('tactful able to fit in easily with people at all levels in the organization which employs him') The other four items were used simply to fill in (e g 'has an active interest in community and world problems')

(v) The students' perceptions of the demands of the training situation were obtained by asking 'How do you think students ought to act if they want to make a success of their period of industrial training?' They were provided with fourteen seven-point scales of the kind employed by Osgood *et al* (3) and asked to give their views by rating each scale The scales were of the following kind

independent	submissive
formal	informal

(vi) Further characteristics of the work situation were obtained by asking students to estimate the amount of time (per cent) they had spent in skilled work on the one hand, and unskilled on the other, and the approximate percentage of their time they had spent working with four levels of employee management, professional technical staff, skilled workers and unskilled workers

Four hundred and forty-nine students of science and engineering who entered the university in 1966 would at various stages of their degree course enter industry for periods of training Those on 'thick sandwiches', for example civil engineers, would not do so until their third year but a small group of students would go immediately into industry for six months after they had registered in the university Those who departed immediately for industry were a randomly selected half of three engineering departments (chemical, electrical and mechanical) They numbered 84 students The other half of these departments began their studies in the university in October and would leave for industry when their fellows returned The research reported in this paper is centred on the 84 students who left immediately for industrial training, but for comparative purposes some preliminary testing of all those students who began their intramural studies in October 1966 is also reported There were 365 intramural students 25 students of biology, 146 students of science and 194 students of engineering No attempt was made to sample the students

All the students of science and engineering (N 449) who entered the university in 1966 (including the 84 students who were about to go to industrial firms) completed two questionnaires the attitude-to-industrial training questionnaire in its prospective form, and the questionnaire requiring ranking of six attributes of a university graduate When the 84 engineering students who went into industry returned to the university in the spring of 1967 to begin their intramural studies, they completed six questionnaires the attitude-to-industrial training questionnaire in its

retrospective form, and the other five questionnaires (II to VI inclusive) detailed above For this group of students, therefore, two scores of attitude to industrial training were available one prospective, the other retrospective

RESULTS

When they looked forward to their periods of industrial training, the 449 scientists and engineers who entered the University of Bradford in 1966 were very favourable in their attitudes The lowest (most favourable) score that could be obtained on the attitude scale was 32, the highest (most unfavourable) was 160 Scores in the bottom third of the scale (32-74) were classified 'very favourable', on the second third (75-117) as 'moderate', and on the top third (118-160) as 'very unfavourable' Seventy-six per cent of the scores fell at the 'very favourable' end of the scale Eighty per cent of the engineers (N 278) were very favourable, 20 per cent moderate, three-quarters of the physical scientists and mathematicians (N 146) were very favourable, a quarter moderate The difference between the engineers and physical scientists is not statistically significant The biologists (N 25) were less favourable in their attitudes 48 per cent were very favourable, 52 per cent moderate Their attitudes were significantly less favourable than those of engineers and physical scientists (chi-square 7 0, $df=1$, $p<01$)

The further results reported below in this paper refer only to the 84 students of engineering who had spent six months in industry When they were re-tested in the spring of 1967 their attitudes to industrial training were still predominantly favourable Approximately two-thirds of their scores fell at the 'very favourable' end of the scale But there had been some deterioration On the prospective form of the scale 91 per cent had made 'very favourable' scores Thirty per cent had improved in their attitude, 70 per cent had deteriorated

The students' experience of bureaucracy was generally 'moderate' as measured by the experience-of-bureaucracy scale Sixteen per cent of the students' scores fell in the bottom third of this scale ('mild'), 66 per cent in the middle range ('moderate'), and 18 per cent in the top third ('severe') There was a significant correlation between scores on the attitude-to-industrial training scale and scores on the experience of bureaucracy scale ($r=0\,315$, $t=2\,9$ $df=81$, $1\%t=2\,64$) A severe experience of bureaucracy was significantly associated with an unfavourable attitude to industrial training

There was a highly significant correlation between improvement or deterioration in attitude and proportion of time spent with professional

staff Improvers and deteriorators were compared with respect to the proportion of time they had spent with professional staff A biserial coefficient of correlation was calculated 0 46 (SE =0 11) Out of 58 deteriorators 22 (37 9 per cent) claimed to have spent less than 10 per cent of their time with professional staff, out of 27 improvers only 4 (14 8 per cent) claimed to have spent less than 10 per cent of their time with employees of this status

Improvers and deteriorators were also distinguished by the 'time-span of discretion' they had enjoyed While only 4 per cent of those who improved in their attitude were checked 'every hour or less', 24 4 per cent of those who deteriorated were checked as frequently as this But there are indications of a curvilinear relationship between improvement (or deterioration) in attitude and the frequency of checks by superiors The majority (61 1 per cent) of those who improved in their attitudes were checked once every one, two or three days, only a minority of the improvers (36 0 per cent) were checked less frequently (once a week or less) It seems probable that very infrequent supervision, like very frequent supervision, is associated with deterioration in attitude to industrial training

TABLE 1
CHANGE IN ATTITUDE AND TIME-SPAN OF DISCRETION

	Work checked		
	Every hour or less	Once every one, two or three days	Once a week or less
Improvers	1 (4 0%)	15 (60 0%)	9 (36 0%)
Deteriorators	13 (24 4%)	36 (61 1%)	9 (14 5%)

Chi square=6 8, df=2, p< 05

After six months of industrial training students tended to place more weight on the virtues of tact and social skills than they had before, but they also placed more weight on independence of mind and willingness to stand up to one's superiors on scientific and professional matters Although the changes fall short of statistical significance at the 5 per cent level of confidence, they suggest interesting trends which would be worth investigation Before they began their period of industrial training, 31 0 per cent of the engineering students had ranked 'tact etc ' high (1 or 2) among the six attributes of a university graduate, afterwards 39 5 per cent ranked this characteristic high (C R =1 30, P_{05}=1 96) Before industrial training 35 0 per cent had ranked independence of mind high, afterwards 42 0 per cent did so (C R =1 10, P_{05}=1 96)

This apparent trend is congruent with the students' perceptions of the demands of the industrial training situation Although emphasis was placed on the importance of social skills (sociability, co-operation, willingness and tolerance), there was little emphasis on conformity and formality, and as much emphasis was placed on the need to be questioning as the need to be willing

TABLE 2
PERCEIVED DEMANDS OF THE INDUSTRIAL SITUATION

Behavioural characteristic	Mean score (range 1 7)	Percentage rating high (interval 1 or 2 out of 7)
Questioning	1 5	94 0
Willing	1 5	94 0
Co operative	1 6	92 8
Sociable	1 7	86 9
Tolerant	1 7	85 7
Flexible	2 1	75 9
Adventurous	2 5	61 9
Considerate	2 7	53 6
Independent	2 8	52 4
Critical	3 0	35 7
Accepting	3 5	25 0
Conventional	3 5	17 9
Conforming	3 5	17 9
Formal	4 7	8 4

DISCUSSION

Sandwich course students who spend periods of their university career obtaining experience of industry enter organizations which are necessarily 'bureaucratic' in some degree Their social relationships and opportunities for learning will be influenced by the characteristics of the bureaucracies in which they find themselves If the hierarchy of authority is pronounced they may have less contact with senior scientific staff then they would like or need, if the 'time-span of discretion' is limited and the jobs they do are rigidly codified, they may have less opportunity for the relatively free exploration of problems and processes which constitutes a satisfying learning experience

The students who were the subjects of this inquiry were enjoying a preliminary and introductory experience of industrial practice They were necessarily engaged in relatively unskilled tasks (52 per cent estimated that they had spent half or more of their time in skilled work, 48 per cent that they had spent half or more of their time in unskilled work) The period is valuable as a socio-technical experience, and the formal

organization of the firm is a dimension of this experience as relevant to its value as its scientific and technological content

REFERENCES

1 AIKEN, M , and HAGE, J Organizational alienation a comparative analysis *American Sociological Review* 1966, xxxi, 497 507

2 JAQUES, E *Measurement of responsibility* London Tavistock Publications, 1956

3 OSGOOD, C E , SUCI, G J , and TANNENBAUM, P H *The measurement of meaning* Urbana, Illinois University of Illinois Press, 1957