COLLEGE TRAINING FOR R&D AUXILIARIES ?

results of survey on support personnel for r & d laboratories

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The burgeoning of research and development activities is a well-known phenomenon for both business and government. Successful R & D efforts may earn huge rewards for private industry. Radio Corporation of America recently estimated that eighty percent of its sales come from products unknown ten years ago. Dupont forecasts that at least sixty percent of its 1975 sales revenue will be from products now in their introductory stages or still to be invented.[1] With government expenditures added, R & D has become an industry in its own right.

Modern R & D work increasingly is performed by task forces and research teams comprising scientific personnel with diverse skills and supported by contingents of aides and technical specialists. Simon Marcson describes a typical large industrial research laboratory with a total staff of about 1000 employees.[2] The laboratory is organized under a vice president of research with five directors of subdivisions in research, research applications, laboratory services, administrative services, and legal services. About half of the total laboratory working force is classified as service personnel, with about 150 employees engaged in secretarial and clerical work, 150 in research model shops, and another 100 in maintenance activities. Sheperd and Brown discussed a similar tendency in the government laboratory to surround each scientist with professional, administrative, subprofessional, and clerical staffs.[3] Indeed, the overhead cost to support a research scientist in a large laboratory has been estimated at almost $50,000 per year.[4]

SUPPORT PERSONNEL NEED

Where auxiliary personnel are in short supply, researchers must concern themselves with a variety of administrative and clerical duties. They may be saddled with responsibilities for recruiting and selecting personnel, training and evaluating their performance, laboratory budget preparations, filing and collecting reports of research progress, manuscript preparation, and other administrative detail. When it is further considered that some scientists are temperamentally unsuited for supervisory or administrative work, the strains on the organization may be considerable. "The supervising structure of engineering organizations," according to a survey of 395 laboratories, "requires at least 25% of all the engineers in the organization."[5]

The present study described here was instituted as a response to the problem as outlined above. It posits that if technical and administrative personnel with requisite skills and abilities were available for R & D employment, research and development personnel could be freed from much of the clerical, administrative and technical tasks they are now performing.

R & D AUXILIARIES

This investigation was chiefly concerned with those employees who might be classified as research and development auxiliaries.[6] These included office managers, research assistants, secretaries, statisticians, and typists who might be called upon to assist research scientists in their activities.

The study was formulated to answer the following questions:

1. To what extent are research and development auxiliaries now being employed in industry, government, and university R & D laboratories? What tasks do they perform?

2. Which skills or abilities are in greatest demand from such personnel?

3. Where did such auxiliaries obtain their training?

4. What special hiring requirements are imposed upon these auxiliaries (age, sex, educational level)?

5. Would a university curriculum to prepare R & D auxiliaries for specialized work in R & D laboratories be desirable?

To answer these questions, some 500 research and development laboratories were contacted recently. These included university research institutes, government laboratories, and industrial re-

search departments. The industrial research departments were further classified by size and location. Respondents were sent a questionnaire instrument together with cover letters to administrative heads of the laboratories requesting their responses to the possible development of a university curriculum for auxiliaries.

Replies were received from approximately 51 percent of the laboratories that were contacted. The high percentage of questionnaire returns gives some indication of the interest that was found in the possibility of university training of R & D auxiliaries. In addition to the high percentage of respondents, many asked for the results of the study as soon as they became available. Especially strong responses were received from university, large industrial and governmental laboratories which tend to indicate inviting hiring patterns in these areas.

QUESTIONNAIRE RESPONSE

The questionnaires were tabulated and evaluated in an attempt to answer the proposed questions. The percentage of surveyed R & D laboratories utilizing each category of auxiliary occupation is presented in Table I.

The data point to a wide use of research assistants, secretaries, and typists, but a lesser employment of office managers and statisticians. The less frequent use of office managers and statisticians as research and development auxiliaries is due to multiple reasons. First of all, it might have been that the office managers' and statisticians' duties were not defined well enough in the questionnaire for respondents to compare accurately their own job assignments with the listed categories. Another possible reason is that office managers and statisticians are often viewed as research personnel instead of as auxiliaries. Most laboratories view statisticians, not as semi-skilled clerical personnel, but rather as practitioners of a highly-specialized discipline.

It is also clear that in many laboratories, administrative details are being carried out by senior research personnel rather than by specialized office managers.

In addition to the auxiliary categories cited on the questionnaire, editors, librarians, and computer programmers were mentioned frequently as being employed by all types of laboratories.

AUXILIARIES TASKS

The questionnaire returns also supply information as to the tasks, skills, and abilities of R & D auxiliary personnel. Table II points out many of the tasks performed by auxiliary personnel, and the type of auxiliaries which perform these tasks. The data indicate a difference between the tasks performed by secretaries and those performed by typists. There seems to be a tendency to utilize secretaries in the performance of non-clerical tasks such as documentation and presentation of data. In these areas they are performing many of the tasks normally associated with a research assistant. It would seem that there is a shortage of trained assistants which makes secretaries utilization imperative. Technically trained secretaries could be used to free other personnel for more research-oriented tasks.

TRAINING SOURCES

The question of where the auxiliaries acquired their job skills was also answered. These results are shown in Table III.

As one would expect, most receive their training from multiple sources. Only a very small percentage of presently-employed office managers, research assistants, secretaries, statisticians, and typists are self-taught and none has less than a high school education. On-the-job training appears especially important for office managers. It would have been interesting to have determined what percentage of these moved to their present jobs from lower echelon positions.

The data indicate a dearth of formal company training for R & D auxiliaries and a large reliance upon high school and college training. A differentiation in the data on Table IV between high school and college-trained employees would have been helpful, had we included this dichotomy in our questionnaire.

SEX AND AGE

The data indicated to some degree the preferred sex and age ranges for the dif-

TABLE I

The Employment of Research and Development Auxiliaries

	Office Managers	Research Assistants	Secretaries	Statisticians	Typists
Industrial Research Depts.:					
*National					
Large (over 100 employees)	39.4%	74.3%	91.0%	48.5%	86.5%
Medium (11-100 employee	34.1	59.6	83.0	34.1	78.7
Small (1-10 employees)	29.6	68.3	86.4	9.1	61.4
**Southern Region					
Medium	50.0	75.0	75.0	50.0	87.5
Small	18.2	48.5	72.8	18.2	57.6
Government Research Laboratories	45.2	87.2	87.2	67.8	90.3
University Research Institutes	37.8	77.8	84.5	46.7	80.0
Overall Percentage	35.0	69.7	84.7	37.9	77.0

* Located in regions other than the South

** More specifically, the southeastern states normally constitution the labor market for Florida State University graduates.

ferent R & D auxiliary categories. Obtaining information of this nature was difficult because of the reluctance of many laboratories to disclose special hiring requirements. Some conclusions can be made, however. Office managers tend to be over 30 years of age. This lends support to the thesis that they are promoted from lower echelon office jobs for the most part. The preferred age range for all other types of auxiliaries is from 22 to 30 with the exception of typist positions where the 17 to 21 age group usually is preferred. As one respondent wrote, "The 17-21 age group usually is inexperienced and lacks long-term employment stability." It seems that most typists are hired right out of high school. Since secretaries between 22 and 30 are preferred, does this indicate that they are expected to have a college degree or equivalent experience?

There does not happen to be any appreciable preference for either sex in the hiring of auxiliaries. While there were no respondents who preferred males over females as secretaries or typists, many indicated either sex would be acceptable. Males, as might be expected, were slightly favored over females as office managers, but females were not restricted from consideration. The positions of research assistant and statistician were expressed as being open to females as well as to their male counterparts in most laboratories. However, it was noted that some research assistant positions are limited to males because of physical tasks associated with the position.

MINIMUM REQUIREMENTS

Data were available on the minimum educational requirements for auxiliaries and are presented in Table IV. No laboratories reported hiring personnel without at least a high school education. The necessity of having a high school degree is an early screening device. Most office managers, research assistants and statisticians have a college degree and many secretaries have college degrees. In all categories except typists, advanced degrees are expected in some laboratories.

TABLE II

The Tasks Performed by Research and Development Auxiliaries

	Office Managers	Research Assistants	Secretaries	Statisticians	Typists
Research Proposals:					
Formulate Proposals.	23%	28%	23%	10%	20%
Type and/or reproduce proposals formulated by other personnel.	7	14	88	4	92
Research:					
Selection of suitable research method for information desired.	15	38	1	27	0
Selection of suitable instrument for data desired.	12	44	1	24	0
Develop instruments for collection of data.	14	39	6	17	3
Type and/or reproduce instruments developed by other personnel.	3	16	53	4	64
Selection of Proper Statistical Technique	7	26	0	76	1
Documentation - (Reference check, Topic Research, etc.)	11	61	25	14	5
Presentation of Data:					
Selection of suitable format.	33	37	21	24	8
Indexing and filing of data.	8	40	62	19	37
Classification into series and sequences.	7	45	34	31	16
Planning graphs, charts and tables.	12	57	13	42	9
Typing and reproducing graphs, charts and tables compiled by others.	5	13	76	8	85
Analysis, synthesis and/or interpretation of data:					
Statistical inference.	4	34	3	70	2
Coding and item analysis.	4	40	6	50	3
Hypotheses and theorems.	5	28	0	44	0
Technical Writing & Terminology:					
Editing and proofreading.	20	35	51	13	26
Briefing research reports.	8	37	10	12	3
Typing and/or reproducing written reports.	5	7	82	4	78
Computer programming–systems analyses, problem analysis.	7	25	2	63	1
Transcription from shorthand and/or voice recording devices.	1	2	86	1	64

It is to be emphasized, here, that these are minimum, not maximum, requirements. Many laboratories expressed a desire for secretaries with college training but lamented the lack of availability of such personnel.

UNIVERSITY TRAINING

It seems evident that there is some interest in the possibility of university training of R & D auxiliaries. The use of auxiliaries is extensive and promises to

TABLE III

Sources of Training for Research and Development Auxiliaries

	Office Managers	Research Assistants	Secretaries	Statisticians	Typists
On-the-job Training	69.3	42.9	25.4	25.3	18.5
Formal Company Training	16.5	14.8	10.2	8.0	7.9
High School or College	96.4	62.4	63.5	85.0	52.8
Self Taught	6.3	8.2	2.5	5.7	2.8

TABLE IV

The Minimum Educational Requirements for Research and Development Auxiliaries

	Office Managers	Research Assistants	Secretaries	Statisticians	Typists
Less than High School	0	0	0	0	0
High School	17.2	30.3	78.3	12.5	97.6
Bachelor	71.8	55.5	19.6	60.3	2.4
Master	9.6	11.8	2.1	23.2	0
Doctor	1.4	2.4	0	4.0	0

expand, provided that such personnel are available. How, then, can universities provide more and better trained auxiliaries? The data point one toward some important conclusions in regards to curriculum offerings.

Office managers either progress from lower level office positions, or the tasks of the office manager are assumed by senior research personnel. Most office managers are college graduates with a strong background in the physical sciences. The training of office managers has a strong on-the-job emphasis. Though most academic programs in the physical sciences are already full and demanding, the inclusion of a course in office management should be considered.

Research assistants are widely used and perform differing tasks from organization to organization. The tasks they perform dictate the required educational background and training needed. The field is open to both men and women, and in some agencies secretaries are performing some of the tasks that are often associated with research assistants.

Of all the categories of R & D auxiliaries that are used, it seems that secretaries could best benefit from specialized university training. Women, and possibly men, trained in the basic secretarial skills and physical sciences would be a valuable addition to many R & D agencies. Not only would these personnel be trained to perform those tasks that are normally associated with secretaries, but they could also perform research oriented tasks. Presently, little training of this nature is being provided.

The data indicate that statisticians are almost entirely university educated and receive little additional training. The tasks they perform are quite specialized and they already seem to be receiving appropriate training in the universities.

Typist positions are filled by young high school graduates who receive little additional training. For the tasks they perform, they seem to be adequately prepared by high school business programs. The better typists move into secretarial positions.

NEED FOR SPECIALIZED CURRICULUM

Study findings point to the feasibility of a college curriculum designed to prepare secretaries, and to a lesser extent stenographers, for specialized work in research and development laboratories. The study suggests that scientists frequently must devote considerable time and energy to auxiliary duties incidental to their primary pursuits when trained helpers are not available. Such duties include preparation, editing, and typing of research manuscripts. It is suggested that promising students in secretarial studies could receive an interdisciplinary college program at the undergraduate level to prepare them for employment in R & D agencies.

Possible patterns of curriculum development might include (1) specialization, (2) an orientation to research methods, and (3) additional course work in the physical and social sciences.

The first alternative would simply provide an area of specialization within existing secretarial science undergraduate programs. Training would be designed to help students acquire a working technical vocabulary commonly utilized by local research laboratories who could probably hire them. Students would become acquainted with recommended styles of typing and transcribing research reports and technical memoranda. The emphasis would be to quickly furnish the secretary with a useful knowledge overlay designed to make her more useful in a specialized field of activity. For example, student transcription could include examples and practice in scientific and engineering symbols and abbreviations, formulas, equations, chemical elements and symbols, the Greek alphabet, and numerical tables of experimental results. Brief profiles of typical companies performing technical work would orient the secretary to the nature of scientific and professional efforts.

R & D SKILLS

A possible second training pattern would seek to develop in R & D auxiliaries an understanding of research methods and some acquaintanceship with basic research skills and techniques. Questionnaire results revealed that secretarial personnel are already utilized in a variety of specialized assignments including selection and employment of statistical techniques, planning graphs, charts, and tables, coding and data analysis, and editing research manuscripts. With further training, their tasks could be extended to research planning, statistical inference and project budgeting, thus broadening their service potential to research scientists. Such training could be provided in one or more specialized course of instruction.

A number of questionnaire responses suggested the desirability of acquaintanceship with fundamentals of the physical and social sciences as a requisite for research auxiliary tasks. One respondent wrote:

> In regard to a university curriculum to prepare secretaries, typists, office managers, and other auxiliaries for specialized work in research and development laboratories we would like to emphasize that such personnel need to be broadly trained but have the basic skills and qualifications. A clerical person, for example, should be able to perform well in a position as a secretary in a biology laboratory as well as one in a physics laboratory or one in a division heads office. Acquaintance with technical and scientific vocabularies, use of symbols, basic mathematics, and knowledge along similar lines is needed in these positions. We seek persons with breadth and flexibility.[7]

The general education programs of major universities afford an excellent opportunity for secretaries to develop a basic interdisciplinary background. Commonly such course work includes the study of man's natural environment, his social environment, the historical background of present-day civilization, and such cultural overlays as language, literature, art, music and philosophy at the upper divisional level such as written and oral communications, symbolic logic, engineering science, statistics, computer programming and information retrieval would prove valuable supplements to a college major in secretarial science or office management for the would-be R & D auxiliary.

SUMMARY

Questionnaires were mailed to some 500 research and development laboratories to determine the extent to which business auxiliaries were utilized and the nature of their assignments. Also investigated was the nature of skills and training required to satisfactorily perform their assignments.

Major conclusions of the study included the following observations (in regards to the questions posed):

1. Auxiliaries are widely used by R & D laboratories. Research assistants, secretaries and typists are employed by almost all agencies while office managers and statisticians are frequently employed.
2. Auxiliaries perform a wide variety of tasks. It was interesting to find that many secretaries perform both technical and clerical duties.
3. There is a strong emphasis on formal education for R & D auxiliaries. With the exception of office managers, there is little on-the-job training and even less formal company training.
4. There seem to be few special hiring requirements for R & D auxiliaries. Rather, an individual's qualifications are the key variables.
   A. Age is not a key factor in the selection of auxiliaries. Office managers do tend to be over 30 and typists between 17 and 21, however.
   B. Most office managers are male and nearly all secretaries and typists are female, but the laboratories indicated the sex does not enter into the employment decision.
   C. Most office managers, research assistants and statisticians have at least a bachelor's degree while many hold advanced degrees. A college degree is not uncommon among secretaries, but few typists have more than a high school education.
5. College training patterns useful for preparing R & D auxiliaries might include either (1) a technical emphasis in present secretarial offerings, (2) specialized course offerings in research techniques or (3) a generalized interdisciplinary orientation in the physical and social sciences.

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