EDUCATIONAL PROJECTS COMMITTEE

Foreign Language Requirements for the Ph.D.

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INTRODUCTION

In 1967 the Graduate Faculty of The Pennsylvania State University transferred to the individual departments the major responsibility for conceiving and implementing foreign language requirements for the Ph.D. degree. In partial response to this opportunity, one of the authors (TFE) conducted a poll of chemical engineering departments granting a substantial number of Ph.D. degrees. A total of 74 departments were sent questionnaires in the summer of 1967 and 56 responses were returned. Interest in the matter of foreign language requirements for the Ph.D. was widespread and was indicated especially by the number of respondents requesting the results of the poll. At the Fall 1970 AIChE Annual Meeting, one of the authors (RLK) was requested by the Educational Projects Committee to prepare a paper on the results of this study. In the Spring of 1971 copies of 55 of the original 56 poll responses (one of the departments had ceased to exist) were returned to the respondees for possible amendment. Fifty of these were annotated and returned. This paper is intended (1) to put the matter into perspective by delineating various contentions which have been made, (2) to examine some data relevant to the role of foreign languages in the professional practice of engineering, and (3) to present and interpret trends which can be discerned from the two polls.

Arguments concerning language requirements seem to be as much visceral as rational. Thus, the spectrum of thinking is illustrated here by a collection of comments made by academic people in response to two questionnaires (1, this work) sent to chemical engineering departments in the United States, Canada, and Puerto Rico and by members of the Graduate Faculty at Penn State in debate of the issue. Other comments have been made to the authors by friends or acquaintances.

1. "There is a wealth of needed information available only to scholars who can read one or more foreign languages and can communicate directly with scholars lacking competence in English."
2. "A chemical engineer working in industry can get any article translated for him on request."
3. "The most common current requirements (reading knowledge of two foreign languages) offer no guarantee that the student will achieve even minimal competence in foreign languages."
4. "The language requirements should be concerned with competence in English as well as foreign languages, both for foreign and American students."
5. "We don't ask our new faculty interviewees about their language competence. Why should we require it of our students?"
6. "It is my personal opinion that languages should be a part of the general cultural equipment of all professional people. As such, there should certainly be some language training in undergraduate programs. Even more desirable is the current trent to begin language training at the very early elementary school years, where such training can be most effective."
7. "I believe [the] ECPD tight-fisted requirement that beginning language courses are skills and cannot be considered as humanities is WRONG."
8. "Statistics is a foreign language."
9. A sociology professor—"[Foreign languages are] absolutely necessary." Another sociology professor—"[I] never have used them."(2)
10. "We all went through it, so they should too!"

From the foregoing comments, three primary justifications for graduate language requirements are seen: (1) cultural, (2) direct personal contact with people of foreign tongues, and (3) reading of technical literature in foreign languages. The significance of the first two is a very subjective judgment and not easily evaluated quantitatively. Probably the cultural and personal contact factors are of increasing importance. It is clear that many chemical engineers find such

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relevance in their foreign language accomplishments. On the other hand, for undergraduates, the ECPD views introductory language courses as "skill" courses and therefore unsatisfactory for meeting the ECPD social-humanistic requirements for accreditation.

FREQUENCY OF APPEARANCE

In order to estimate the importance of foreign languages in the chemical engineering literature, two issues of Chemical Abstracts in 1967 and four issues in 1970 were surveyed to determine the original language of articles in the selected sections. Table 1 provides a condensation of the survey data. There are few surprises, if any, in this table, but it is helpful to have such a quantitative measure of frequency of appearance. It would be desirable to extend this survey back to earlier years, but Chemical Abstracts did not report the language of publication before 1965. It should be noted that complete English translations of many of the non-English articles are available in many libraries and that many foreign scientists and engineers publish regularly in English language journals.

Table 1

SURVEY OF CHEMICAL ABSTRACTS FOR LANGUAGE OF PUBLICATIONS

		Number of Articles	Percent of Articles in English	Russian	German	French	Others
22	Physical Organic Chemistry	250/554	54/71	29/14	5/3	5/9	7/3
48	Unit Operations and Processes	189/249	67/53	22/24	5/8	1/4	5/11
51	Petroleum, Petroleum Derivatives, and Related Products	112/139	35/35	34/35	13/11	2/3	16/16
66	Surface Chemistry and Colloids	62/177	76/56	6/25	5/6	5/4	8/9
67	Catalysis and Reaction Kinetics	64/167	44/53	36/26	11/5	3/4	6/12
		Average	55/53	26/25	8/7	3/5	8/10

Notes: a) The numbers appearing before the slashes correspond to the April 10 and May 1, 1967 issues of Chemical Abstracts. Those following the slashes represent the data from the May 25, June 1, 8,
b) Books and patents were not included in the survey.
c) Among "Others," Japanese was the most common language, comprising about two percent of the papers.

HISTORY

In interpreting the results of the poll and the trends observed, a brief look at the history of Ph.D. language requirements may be helpful. Instruction in foreign languages as a part of advanced study surely goes back to the earliest civilizations. As an example of moderate antiquity, the 196 B.C. inscription in Greek and heiroglyphic and demotic Egyptian on the famous Rosetta Stone (3) must have been produced by a person or persons familiar with all three languages. This stone later proved to be the key to deciphering the ancient Egyptian alphabet and unlocking the door to a lost culture. In 1932 Fuchs (2) surveyed 64 American universities and several foreign ones in developing a Ph.D. thesis on the language requirement for the degree of Doctor of Philosophy. The historical information presented here is taken from his thesis. The first degrees of Ph.D. in the United States were granted at Yale in 1861. Although graduate studies had existed previously, the first formal graduate school in the United States was founded by Johns Hopkins in 1876.

Fuchs explained the background of the language requirement in this way: "At the time of the first awarding of this degree, very few schools had definite legislation in regard to the language requirement for the doctorate, and in many cases such legislation was not enacted for some considerable time later. Explanations received from the deans or secretaries of the graduate schools where this condition existed seem to be in agreement. The number of candidates during the early development of the graduate school was so small that no attention was given to a definitive formulation of this requirement. The deans believe further that, although there was no general rule compelling a reading knowledge of French and German, the general attitude was that these tools were necessary for the proper conduct of research and advanced study. As a consequence, practically all candidates for the degree did acquire this reading knowledge." While many schools eventually instituted a reading knowledge of French and German as their first written requirements another pattern also appeared frequently. This pattern is illustrated by the University of California which "had no language requirement prior to 1888 when a knowledge of Latin equal to that for admission to the College of Letters was required. French and German were added in 1896-97, and the three languages were required until 1903-4 when Latin was discontinued as a general requirement."

Fuchs' survey of foreign language requirements in Europe in 1932 found "no statutory requirement in regard to a reading knowledge of foreign languages for the doctoral degree in Great Britain." In Germany three and sometimes four foreign languages (Greek, Latin, English, French) were required. In France two languages were required for the State Doctorate and there were no specific language requirements for the University Doctorate (which was the degree sought by most Americans). It appears that the widespread requirement of reading knowledge in two modern foreign languages (almost always French and German) was not a transplant from European institutions but developed in the United States from a real need for the competence. Evidently the scientific and engineering disciplines (especially chemistry and chemical engineering) found these generally imposed requirements acceptable as advanced study in such technical fields became common.

Little significant change occurred until the period between the end of World War II (1945) and Sputnik I (1957). In this time of political and scientific ascent of the Soviet Union, the Russian language became an acceptable substitute for French. Currently it is at least on a par with German in prominence and has perhaps become predominant. Kobe (4) documented this trend with a survey on graduate study in chemical engineering in 1956-57. He also noted that four schools of the 47 replying to his survey required only one foreign language; the remainder requiring two. This is in contrast to Fuchs' 1932 observations which showed none of the 64 schools included in his survey requiring only one language or less. The near-unanimity in the requirement of *reading* knowledge in *two* modern foreign languages which prevailed over more than three decades is remarkable. However, both Kobe and Metzner (5), in back-to-back articles on graduate study in chemical engineering, deplored the lack of attention being given to optimizing the effectiveness of any imposed foreign language requirements. But change is underway now, as the most recent polls show!

RESULTS OF POLLS

Table 2 summarizes the language requirements existing at various times. Two polls are shown for 1967. The first was a small part of a wide-ranging survey of departmental affairs by Johnson (1). He polled 150 chemical engineering department heads in Canada, the United States, and Puerto Rico and received 78 replies, 71 of which were of value with regard to the language question. One month later the TFE poll was sent to the 74 departments in the United States granting the largest number of Ph.D. degrees in chemical engineering. Despite the somewhat different populations polled, the results of these two independent surveys are seen to be quite consistent.

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Table 2

Ph.D. LANGUAGE REQUIREMENTS AT VARIOUS TIMES.

Year	Number of Schools Polled[a]	Reading Knowledge in Two Languages[b,c]	Reading Knowledge in One Language	Comprehensive Knowledge in One or Reading Knowledge in Two	None	Source
1932	64	62[d]	0	0	0	Fuchs(2)
1956-7	47	43	4	0	0	Kobe(4)
1967	71	29	26	10	6	Johnson(1)
1967	56	21	23	10	2	TFE Poll
1971	50	1	25	5	18	RLK Poll

Notes: a) The 1932 poll was of graduate schools generally. The remaining four polls were of chemical engineering departments.
b) Schools with more stringent requirements are included in this column.
c) In a few versions, non-foreign language substitutions could be made for one of the two required languages.
d) It is likely that this number should be 64. Fuchs' tabulations and text are ambiguous on this point.

The first trend to be observed is the total collapse from virtual universality of the requirement of reading knowledge in two languages. About one-half of the changes have been simply to require only a single language. There has also been an attempt to make the language requirement more meaningful to present day professional engineers by stressing more comprehensive knowledge of a single language. This is even more clear from the elaboration provided on many of the questionnaires. Also clear from the comments is that many of these well intentioned attempts have been abandoned only a few years later in favor of no language requirement at all. The exploding number of departments with no requirement may well be understated by the date of appearance of this paper. The question is under consideration by many faculties at this time.

At the time of the 1967 TFE poll, of those 18 departments who had not revised their requirements within five years 78% required a reading knowledge of two languages. The rest required one language. Of those 38 departments with some changes, 18% still required two languages, 53%—one language, 21%—two languages or one in depth, and 8%—none at all. Between the 1967 TFE poll and the 1971 RLK poll, 30 departments

changed their requirements. Of these, 50% went to no requirement at all. Seven and 43% went to comprehensive and reading knowledge of one language, respectively. In one outstanding instance, a department now requires reading knowledge of one language where before it had no requirement.

Other changes are occurring as well. Among departments requiring language competence there has been extensive liberalization as to which languages are acceptable. Increased usage of other areas of study (such as computer programming, statistics, specialized research techniques, or other coherent learning experiences) as substitute for a language is evident. This too may be subsiding in the rush to eliminate all language requirements.

Although this point was not specifically explored by the questionnaires, it is clear from many comments that the opportunity for change resulted largely from the decisions by graduate schools around the country to allow the individual academic departments to set their own language requirements. In 1969 Educational Testing Service polled the 287 member institutions of the Council of Graduate Schools. Responses were received from 197 schools, of which 96 had a graduate school-wide foreign language requirement for advanced level degrees and 96 did not (five schools did not respond on this question) (6). It may be helpful to illustrate the result of the relinquishment of uniform requirements. At Cornell, sometime before 1967, about two-thirds of the academic departments retained a language requirement while one-third eliminated it. Table 3 shows the results at Penn State two years after the departments became responsible for setting their own requirements (7).

TABLE 3. DISTRIBUTION OF DEPARTMENTAL LANGUAGE REQUIREMENTS AT PENN STATE

Requirement	Total
Reading knowledge of two languages, comprehensive knowledge of one language, or choice between these two requirements	17
Reading knowledge of one foreign language with some additional requirement such as study in another language or in some other pertinent field	29
Reading knowledge of one foreign language	13
No language requirement	22
Total	81

These results were for 1969. As such, they can be compared to the results for chemical engineering departments in Table 2. The distribution of requirements are seen to be quite consistent. The Penn State actions are also seen to be quite similar to those which occurred at Cornell. It might be noted that only five of the 81 Ph.D. granting departments at Penn State left their requirements unchanged.

CONCLUSIONS

The importance of accomplishment in foreign language in the conduct of scholarly work resulted in a remarkably uniform and stable pattern of foreign language requirements for the Ph.D. degree in American universities. The experiences of the authors suggest the following observations. Following World War II improved communications and transportation technologies have led to decreased need for individual talent for translation and placed greater importance on conversational fluency and cultural awareness. These changes are reflected in the strong trends toward decreased, and in some cases more meaningful, language requirements among chemical engineering departments. Now individualization of language instruction to meet personal needs is of prime importance. Fortunately, outstanding self instruction in practically any desired foreign language is available via tape recordings and accompanying textual materials. Already the presence of the computer is being felt in the modernization of language instruction. Universities, commercial publishers, public libraries, government, and industrial organizations should be able to provide excellent assistance to any individual in fully and effectively satisfying his foreign language need in the immediate future. □

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