

THESIS



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Engineering Faculty & Leadership
Engineering
2000-2001

H I S T O R Y O F E N G I N E E R I N G E X T E N S I O N

A T T H E

P E N N S Y L V A N I A S T A T E C O L L E G E

May 7, 1927

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THESIS

HISTORY OF ENGINEERING EXTENSION AT PENN STATE

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INTRODUCTION

When the first educational experiments outside the established Universities were begun, an expression came into being which has since become paraphrased by the Universities of America. An English exponent of adult education said, "Though it may be impossible to bring the masses requiring education to the University, may it not be possible to bring the University to them?" Today we hear many institutions expressing this same idea in such phrases as "Our Campus is the Entire State".

BEGINNINGS OF ADULT EDUCATION Schools for the education of the adult pupil originated in England during the 18th century as an out growth of the Sunday School movement. Although most of the education was religious in character secular instruction was given and classes in scientific subjects also flourished. In 1851, the English government made monetary grants for this work and in 1873 the University of Cambridge instituted the first University Extension. Oxford adopted a similar plan in 1876.

The original form of University extension teaching has not declined in England as it has in America. The characteristic features of the English plan are lectures at local centers with a class and examinations following the lecture. Despite the fact that most of the courses were academic, they were exceedingly popular. Oxford has a record of over half

a million persons attending such lectures.

THE LYCEUM The extension idea made its appearance in America in the form of lectures and assigned readings. The old Lyceum had for shadowed this as early as 1831 and the widely known Chatauqua movement and its summer schools, lectures and a limited amount of correspondence instruction made its appearance in 1874.

UNIVERSITY EXTENSION In 1887 an address before the American Library Associations on University Extension in England created wide interest among public libraries and extension work in connection with the libraries was begun. In 1889 Columbia University through Teachers College offered some science classes outside the University. It was during this decade that the Universities of Chicago and Wisconsin entered the work followed by many of the leading Universities of the country.

ENGINEERING EXTENSION The Penn State College began its first Extension work in 1906 and thus became one of the pioneers in this work. It was one of the first to dispose with the formal lecture as a means of teaching, making use rather of class instruction, correspondence instruction and modifications of class instruction. In keeping with the great industrial developments of Pennsylvania, much of the work given applied directly to the students work in the shop or mill. Dr. Edwin E. Sparks was presi-

dent of Penn State during the evolution of the extension work. He believed that the State College had three great fields of activity: namely, Research, Resident Instruction, and Extension. His motto became "The State is our Campus" and plans were formulated for Home Economics Extension, Agricultural Extension, Mining Extension and Engineering Extension.

EARLY EFFORTS The history of the growth of the Engineering Extension education in Pennsylvania is a constant changing of attitude of employees and employers toward practical training. Many employers were willing to go on as before being satisfied with the traditional requirements for a job. Many were exceedingly skeptical and some openly antagonistic. The first Engineering Extension class was organized in Williamsport in 1910 by Dean John Price Jackson co-operating with the local school board. This venture was entirely satisfactory and in 1911, Dean Jackson organized an apprentice School for the apprentices of the Pennsylvania Railroad shop in Altoona.

In 1913, Dean Jackson left the College to become State Commissioner of Labor and Industry. Professor Moyer then took charge of all the Extension activities and immediately planned to have Faculty members conduct classes and give lectures to shop groups. One of the first to be organized was with the West Penn Power Company at Connellsville. This group was so successful that similar groups were met

other Professors in subsequent years.

GENERAL Conditions in America were so different from those in America that the Extension work must be different in character as well as the means of presenting it. The lecture idea prevailed here for a while but was soon abandoned when efforts were to get next to the man on the job. In this form of practical applied education for shop men, primarily, the Engineering Extension Department of Penn State has been a pioneer. The writer has already pointed out some of the various forms of activities attempted by the Department. In addition to the shop classes, other forms of endeavor have been found to be equally necessary. Among these are the use of the permanent Branch Schools, co-operative Night Schools, Foreman Training, and numerous other projects are essential to the successful operation of the Department.

NIGHT SCHOOLS

DEVELOPMENT OF NIGHT SCHOOLS Originally the Engineering Extension Department conducted no Night schools of its own. All the work was done by means of classes in various plants about the state. In order to develop the field of night school work Professor Miller found it advisable to extend cooperation of the Engineering Extension Department to the Y.M.C.A. schools. For the most part these schools were in successful operation and the connection with the College did much to further educational interests in such communities. Later on local night schools which were not connected in any way with the local organization sought connection with the Engineering Extension Department. Still later local boards and Chambers of Commerce found that a good night school was a necessity in their community. With these facts in mind local night schools were organized, one each year for several years. All night schools were combined in 1927 as one unit of the extension Department with Mr. Montague in charge. Schools are classified as Branch Schools and Cooperative Schools. Branch Schools are those which were either organized by the Engineering Extension Department or taken over by them and the Cooperative Schools are those maintained by the Y.M.C.A.'s and other local agencies which secure the cooperation of the college in the form of text material, advice, and supervision of their educational work.

CO-OPERATION WITH Y.M.C.A. AND OTHER ORGANIZATIONS

Much of Professor Gaum's work in Philadelphia was done with the Philadelphia Young Men's Christian Association in the organization of classes in Philadelphia plants. Use was made of the regular Shop Engineering texts and Professor Gaum rendered a supervisory service to local groups and in some cases teaching them. So successful was this work with the Y.M.C.A.'s that the Engineering Extension Department was invited by Y.M.C.A.'s throughout the state to coop rate in other educational work. Among schools of this type may be mentioned Y.M.C.A.'s in the following cities: York, McKeesport, Pottstown, Ridgway, Hanover, Oil City and Chester, as well as the Cambria Library Association at Johnstown.

POLICIES The control of educational matters in the various Y.M.C.A.'s are usually vested in an educational secretary. As long as the same man was on the ground from year to year the Engineering Extension Department had splendid success in this type of work. With the more or less constant shifting about of Y.M.C.A. secretaries much difficulty was found in providing for the continuation of the work inaugurated. This fact accounts largely for the comparatively small number of Y.M.C.A.'s that are cooperating at present with the Engineering Extension Department. It was a policy of the Department to use the text material as prepared by the Department in these groups. However, there was little uniformity in the amount of work required, the qualifications of in-

structors, and equipment used. All men who completed the work in their local night school were granted certificates given by the Engineering Extension Department.

With the appointment of Mr. Montague to be Head of the night school work steps were taken to standardize the instruction given in all the Y.M.C.A. evening schools and similar organizations. A trial cooperation contract was entered into by each of the organizations to use the service of the Engineering Extension Department. The Y.M.C.A.'s continue to use Extension Department material wherever possible and to maintain a local educational committee who will insure the continuation of the educational work in the event that the Educational Secretary leaves. The Extension Department gives the supervisory service and assists in every possible way with the successful operation of the school. Upon the completion of any course in which the Engineering Extension Department material is used the usual Extension certificate will be granted.

SUPERVISION The steps toward more rigid conditions of teaching things met with the supervision described above, instant approval from the Y.M.C.A.'s at York, Pottstown, McKeesport, The New Jersey Zinc Company school at Easton and the Cambria Library Association school at Johnstown. Under the present method of operating this work, instruction in all these schools has been made more uniform, the quality of teaching in-

struction has been raised and the value of an Engineering Extension certificate has been increased. One obvious advantage is the possibility of transferring credits from one co-operative school to another.

A NOTABLE CO-OPERATIVE SCHOOL Among the more notable Y.M.C.A. Schools with which the Engineering Extension School has been connected may be mentioned the York Evening School. The manufacturers of York are very proud of their Y.M.C.A., and are ardent boosters for every phase of this work. Under the capable direction of Mr. Jason B. Snyder, secretary of the York Y.M.C.A. and F.A.R. Hoffeditz, Educational Director of the Y.M.C.A., the school has been developed which is second to none of its type in the country. With their new building and its splendid design and equipment for educational work it is possible to give courses of every kind for the development of engineering ability. It must not be gleaned from these statements that the Y.M.C.A.'s give only courses which are prepared by the Engineering Extension Department. There are many exceptions and some of the courses which are given in the Y.M.C.A. schools would barely come within the province of the Engineering Extension Department. With the Foreman Training work that the college has been doing, many Y.M.C.A.'s still find it politic to conduct local foremanship groups, with the Y.M.C.A. text.

PRIVATELY MAINTAINED SCHOOLS There are many other organizations in the state at the present time which are conduc-

ting Night Schools with varying degrees of success. Several of these are now seeking the cooperation of the Engineering Extension Department realizing fully the Benefits to be derived with cooperation with the State College, but before these schools can be added to the list of the cooperative night schools rigid standards must be complied with, especially that requiring a local committee to insure continuity of the work.

Although many local Y. M.C.A.'s were caring for the problems of night school work very ably, a survey of the state should show that in many of the second and third class cities of the state, nothing was being done to meet the demands for adult education. These cities were in most cases industrial centers in which much technical labor was used. Professor Loyer saw that a modified Engineering Course not exceeding three years in length and giving suitable recognition by the College for its completion would no doubt attract large numbers. We shall trace in the following pages how the permanent branch schools developed in the various communities of the state.

BRANCH SCHOOLS

ALLENTOWN In 1912 Professor Moyer made his first venture into the field of night school work at Allentown. A local committee of citizens headed by John Allen was very much interested in a night school. The local committee assumed all the responsibility for financing and promoting the local school. As time passed it became apparent that for the greatest success of the School at Allentown that it should be organized and become a part of the Engineering Extension activities entirely; hitherto the school had been managed and directed by a local committee. Various Engineering subjects have been given including Textile Engineering. The plan of study for schools of this type is a modified three-year engineering course leading to an Engineering Extension diploma. The work given is of an exceptionally high grade although it is not on a par with college credit instruction as a high school education is not a prerequisite for entrance. The school at Allentown is still one of the most thriving of all of the branch schools. Its courses have been especially applicable to local industries and other groups have made good use of them year after year.

WILKES-BARRE The Wyoming valley of which Wilkes-Barre is the central point includes four of the large anthracite coal mining companies. In their collieries and drafting rooms hundreds of young men are employed who use special technical training. With the Branch School in Allentown in successful

operation, the attention of the Engineering Extension Department was turned to Wilkes-Barre during the fall of 1916. With the co-operation of the Chamber of Commerce and the local industries, a Branch School was opened that same autumn. This school offered three year courses in Civil, Mechanical, Electrical, and Mining Engineering. These courses eliminate much of the theory and deals chiefly with the fundamentals and practical side of those forms of engineering which they represent. No College credit is given but the courses offer a thorough training in the essentials of an engineering and upon successful completion an Engineering Extension Diploma is awarded. This school has always been one of the best in point of attendance and completions. This no doubt is due to the fact that there is a large opportunity to connect the practical theory of the class room with the day's work. The outline of the 1927 curriculum is given below.

CIVIL ENGINEERING

First Year

First Term

Algebra

Mechanical Drawing

Second Term

Trigonometry

Mechanical Drawing

Second Year

Mechanics

Theory of Surveying

Advanced Mechanics

Theory of Surveying

Third Year

Strength of Materials

Structures

Hydraulics

Structures

ELECTRICAL ENGINEERING

First Year

First Term

Algebra

Mechanical Drawing

Second Term

Trigonometry

Mechanical Drawing

Second Year

Mechanics

Direct Current Electricity

Advanced Mechanics

Direct Current Electricity

Third Year

Strength of Materials

Alternating Current

Electricity

Electrical Power Transmission

Alternating Current

Electricity

MECHANICAL ENGINEERING

First Year

First Term

Algebra

Mechanical Drawing

Second Term

Trigonometry

Mechanical Drawing

Second Year

Mechanics

Heat

Advanced Mechanics

Principles of Steam

Engineering

Third Year

Strength of Materials

Kinematics

Power Plant Economics

Machine Design

MINING ENGINEERING

First Year

Algebra

Mechanical Drawing

Trigonometry

Mechanical Drawing

Second Year

Mechanics
Mining Methods

Mine Gases and Ventilation
Mine Machinery

Third Year

Mining Practice
Direct Current Electricity Alternating Current Electricity

Mining Practice

SCRANTON In 1922 The Engineer's Club at Scranton sought the advice of Professor Miller as to opening a branch school in their city. Scranton is a good sized community and is located in the heart of the anthracite region. Some three thousand engineers are employed in the anthracite industry and allied fields. Professor Miller found the field like that of Wilkes-Barre, very promising for courses in Electrical, Mechanical, Civil and Mining Engineering; accordingly a branch school was opened in the fall of 1922. This school, like the others, has continued to prosper and its graduates have readily found positions with local concerns. It may be interesting to note that Scranton was one of the first Branch Schools to organize an Alumni Association.

READING A branch school at Reading was opened in the fall of 1924. Reading is situated in the heart of the knitting industry. There are plants with several thousand employees engaged in textile work. With these men to be considered a course in Textiles was included among those offered in addition to the Engineering Subjects taught elsewhere.

Although this school is only three years old, it gives much promise because of the character of the industries which it represents.

WILLIAMSPORT During the summer of 1925 Professors Miller and Gaum together with Mr. Chaffee and Mr. Montague made a survey of Williamsport to determine its possibilities as the home of another branch school. Williamsport is a thriving industrial community including among its plants the Lycoming Motors and the Lycoming Rubber Company, as well as many smaller industries. The situation there was found favorable to the founding of a night school and the Chamber of Commerce gave hearty approval to the project and aided in its promotion. Classes were begun in the fall of 1925. One of the outstanding features of this school is that the curriculum includes a course in Industrial Engineering. It is believed that this is one of the first night schools to give a course of this nature. The Industrial Engineering course has been exceptionally popular with executives and has proven its value in schools of this type. Naturally other engineering courses are given to meet the local demands.

ERIE The Engineering Extension Department, always eager to find new fields for Branch schools, made a strong bid in 1926 for a school in Erie. Mr. Grosche of the Erie Public Schools already had a night school in operation, giv-

ing work of high school grade. Many of the industries thought that the work which the Engineering Extension Department was giving in their branch schools would duplicate that given in their own school. To meet this situation a curriculum was drawn up which provides for work of a higher grade than given hitherto in a branch school. A high school education is required for admission to the courses given. Three evenings a week are devoted to classes instead of two as in other centers. These higher standards resulted in attracting to the branch school some eighty young men who were eager to get engineering training. Although the Erie School is somewhat smaller than the other schools it is thriving and promises to grow, as time passes.

WHERE MAY BRANCH SCHOOLS BE INSTALLED? The Branch Schools require a city of seventy thousand and upwards to make their operation practicable. The fact that there are already many educational institutions in Philadelphia and Pittsburgh precludes any possibility of founding Branch Schools there. Allentown, Reading, Scranton, Wilkes-Barre, Williamsport and Erie represent ideal cities for this type of instruction. Of the remaining cities in the state Harrisburg and Altoona are the only ones left which under present conditions could support a branch school. Harrisburg is a capitol city rather than an industrial town and the city of Altoona is tied up with Pennsylvania Railroad shops and

has few other industries. These shops already have their apprentice schools and night classes.

PRISON SCHOOLS The administration of prison schools is also assigned to the night school section. It is the policy of this Department to give to the prison schools the same careful instruction that is given to their schools. However, an entirely different type of human material is encountered and results must be measured in a different way. Another fact is worthy of notice with the prison schools and that is that the various Boards of Directors pay a very modest sum for the instruction.

Even at the beginning of the work of the Extension Division use was made of these services of the college for inmates of the state's prisons, and in one institution or another these activities have been continued down to the present time.

During Professor Gaum's stay in Philadelphia classes for the men confined at the Eastern Penitentiary were organized. Shop Mathematics and Mechanical Drawing classes were especially popular and under the instructorship of the local college representative, work progressed rapidly. For the men who were able to carry more advanced work, the regular correspondence courses were offered. These classes continued for several years until they were disbanded on account of a change of management of that Penitentiary.

SUNBURY JAIL In November 1922, the Reverend Dr. B. Talbot Rogers of Sunbury inquired of Dr. Thomas, President of the College as to what could be done for the men confined in the county jail at Sunbury. Professor Miller conferred with the Warden and arrangements were made for the opening of classes there. The local Kiwanis Club paid for the material used and a local instructor was used. As the Engineering Extension Department barely receives sufficient funds for its regular work, it was impossible to continue to offer this work gratuitously and the project lapsed.

ROCKVIEW PENITENTIARY In the fall of 1923 arrangements were made whereby the Engineering Extension Department organized classes at Rockview Penitentiary, located six miles from State College. Messrs. Rosene and Catherman and Chaplain Metzger gave of their own time during that winter to carry on the classes. That the classes were successful is certain, as more extensive classes were arranged for in 1924. Because of our unprecedented demand for promotion work, in the industrial field, only one man from the Engineering Extension Department was available for this project. Accordingly it was arranged to secure four other instructors and for the first time, the Penitentiary Board assumed the burden of transportation, materials, and a portion of the teachers' salaries. At the conclusion of the work in 1925, Commencement exercises were held for the men.

Because of the growth of the school Mr. F. L. Hendrick of the Engineering Extension Department was secured to act as director of the work the next year. His evenings are devoted to this work and in no way conflicts with his services to the Engineering Extension Department. However, the selection of a staff member as director of the school assures that the work at Rockview will be carried on in keeping with the policies of the Co-operative and Branch Schools. In 1925-26, only technical instruction was given as the reading, writing and arithmetic had been taken over by a prison school under direction of the chaplain. The same work was carried on in 1926-27. Courses in Gasoline Automobiles, Accounting, Electricity, Blue Print Reading, Advertising and Salesmanship, Steam Boilers, Carpenters Arithmetic, and Shop Arithmetic can always be depended upon to fill classes in these subjects.

The School is in session at Rockview from October 20 to March 30, two evenings a week and two hours each night. At the completion of the year's work, the usual Engineering Extension certificate is awarded at the Commendement Exercises. In 1926, Dr. Ellen C. Potter Head of the Department of Welfare gave the Commencement address.

FUTURE FOR PRISON SCHOOLS It is not likely that the prison schools will expand much more. The Western Penitentiary at Pittsburgh is in close proximity to two large universities. However, at the Pennsylvania Industrial Reformatory at Hunting-

don there is an opportunity. The distance of forty miles makes it impossible for us to operate as we do at Rockview. It is quite possible that the correspondence methods used at Sunbury, described above, might be extended to all the county jails, if the prison wardens will cooperate in this activity.

With the night schools in successful operation, the attention of the Staff members was turned to the preparation of improved lesson material for the night schools and for the rapidly increasing number of shop groups. The University of Wisconsin had already placed in the field, a number of Shop Engineering Texts written by members of the University Extension Staff there. However, there appeared to be many courses in which more suitable material could be prepared.

PREPARATION OF LESSON MATERIAL

In no field has the Engineering Extension Department been more of a pioneer than in the preparation of lesson material for all ranges and types of work. Early experience in conducting classes for industrial employees showed many defects in existing text material.

SHOP ENGINEERING TEXT The first needs along this line was a text in Shop Engineering. The staff under the direction of Professor Miller spent a great deal of time in the preparation of a thirty-three short unit course covering Shop Arithmetic, Shop Algebra, Shop Trigonometry, Mechanics, Strength of Materials, Mechanics of Heat, Elementary Electricity, Mechanical Drawing, Shop Sketching, and Machine Design. In order to get the material out at low cost, it was mimeographed, the work being done by the members of the staff at odd hours, and in the intervals of other work.

ADVANTAGES OF SMALL UNITS The flexibility of a series of short units permits the planning of a course to meet the special needs of an individual or a group of individuals. Many public utility industries and other corporations, especially find the idea valuable as it allows their men to purchase only the material applicable to their work.

The unit form of presenting lesson material for extension work has been used consistently by other extension services including the Extension Department of the University of Wisconsin.

The use of pamphlets as offered to replace texts has also been used with success by the commercial correspondence schools.

The unit idea has certain advantages which cannot be equaled. The use of short subdivisions makes it possible to lay out a course of almost any length as well as making it applicable to any degree of previous education. The completion of one unit is an inspiration to begin the next. This appeal is especially strong in shop groups as well as with the regular correspondence students.

The unit form, with its simple arrangement, though designed originally for correspondence use, makes it particularly valuable to the practical men without teaching experience who often are called upon to take charge of local industrial groups. The same type of instructor is frequently met with in the co-operative evening schools and the texts have been largely used there.

PREPARATION OF NEW MATERIAL Through the growth of the Department facilities are available for the preparation of any new material needed. With the assistance of members of the Industrial Engineering Department, our eight unit course in Forman Training was prepared. This was followed by a fifteen unit course in Public Utility Economics. Another course was prepared in 1926 along the same line more applicable to industrial employees in general. In preparation, should be mentioned the unit course for Railway Trainmen.

It should not be inferred from the preceeding paragraph that the Engineering Extension Department goes about the preparation of lesson material more or less independently of the user. First of all, it should be made clear that no lesson material is prepared until there is a distinct demand for it from the industry concerned. When the demand is apparent the Extension Department seeks a statement of the things desired by that industry. The Staff then prepares a draft of the course which is submitted to the industry for approval. The industry is perfectly free to criticise the material and make suggestions for improvement, and even offer additional material. It is often necessary, to satisfy the industries concerned to write and rewrite the material, two or three times before securing their approval. Even when the industry gives its final approval to the material, it is not obligatory for members of the industry to use the material prepared by the Engineering Extension Department for their classes. Their cooperation in its preparation is the desired thing.

SUPPLEMENTARY MATERIAL In many of the courses offered by correspondence, use is made of existing text-books. However in no case is the text sent out without supplementary material prepared by a member of the Engineering Extension Staff which adapts the regular text to correspondence instruction purpose. As mentioned before, the Engineering Extension

Department personnel is now large enough so that if a demand comes for a new course, some member of the staff can be assigned to the preparation of the lesson material and the course is soon available for general use.

COLLEGE CREDIT MATERIAL The nature of the College-Credit courses makes it necessary that the regular College-texts be used. Here as in all correspondence work of this Department, supplementary material is prepared which is sent out with the assignments based on the required text. This covers suggestions as to methods of study and items of primary interest so that the student may concentrate on these.

The preparation of special courses is described under those headings such as Foreman Training, College Credit, Business.

We shall now turn to some of the applications of the material prepared by the Department. Oftentimes the same material is used in night schools, supervised home study, and correspondence instruction. The handling of the text material and the kind of instruction varies however.

SUPERVISED HOME STUDY

USE OF A SUPERVISOR The Class instruction such as was given in the night schools and shop classes seemed so successful that there could be no disadvantage connected with it. The text material had been brought to a high state of perfection and its content contained the material sought. However, as shop classes progressed, it was found that all the men did not make a uniform progress. This was not entirely attributable to the inequality in previous education of the men as it was to the fact that some had more time for preparation than others and shifting hours of labor made it often difficult if not impossible to meet with the class. To meet this situation, the class group became a Home Study Group with the teacher now available at definite times to give any assistance needed. Most of the lessons are prepared at home, and the completed lessons sent to the Engineering Extension Department for correction. Attendance at a class is no longer necessary except as the individual has something he needs help on. The supervisor usually is a member of the firms staff who can spare enough time to assist the men but does not have time to be a teacher.

PUBLIC UTILITY GROUPS One of the first corporations to avail themselves of this new form of training was the United Natural Gas Company at Oil City. Instead of having a local supervisor at a common center, a travelling supervisor visited

the men at the pumping stations from Butler to Kane. The work was so successful that other Public Utility companies organized similar groups. Among these were the West Penn Power Company men and those of the Penn Central Light and Power Company. More recently the Citizens Light and Power Company at Oil City. The Edison Electric Company at Lancaster have formed similar groups. The supervised material is very satisfactory with this type of group because the hours of labor are usually on a shift basis.

APPRENTICE TRAINING Although many men decry the passing of the apprentice system in manufacturing industries, there are still a great many firms in Pennsylvania operating large Apprentice Groups. The usual plan is for the apprenticeship to last for a period of three years of which a portion of the working day is spent in the classroom learning shop mathematics, drawing, etc. The U. S. Aluminum Company at New Kensington has for the last several years arranged with the Engineering Extension Department to give the instruction in the related subjects. The Aluminum Company provides a local instructor and all lessons are sent to the College for correction. Ordinarily about forty-two men will be enrolled from this plant at one time, all in various stages of progress.

One of the more recent firms to turn to the Engineering Extension Department for such training is the Landis Tool Company at Waynesboro. Fourteen men are enrolled in the first

years work.

Closely allied to the subject of Apprentice Training is the subject of Foreman Training. Peculiar as it seems many firms could see the benefit of educating the rank and file of their employees long before they realized the need of providing training for their foremen in the matters which involved the handling of men, the reduction of costs, safety work etc.

FOREMAN TRAINING

DEMAND FOR FOREMAN TRAINING As early as 1920 appeared a demand for Foreman Training work to be developed by the Engineering Extension Department. Accordingly Professor Miller brought the subject before the Annual Convention in 1923. At the conclusion of the convention, representatives of the industries present had sketched an outline of what they believed a course in Foreman Training should cover. Following these suggestions members of the staff in cooperation with P. P. Henshall and J. O. Keller of the Industrial Engineering Department prepared a course in Foreman Training which was submitted to those representatives present at the 1922 Convention. Further suggestions and criticisms were offered and early in the fall of 1922, the course was approved by industry and offered to the public.

SUBJECTS COVERED Under this Foreman Training plan, eight pamphlets covered the following subjects: Responsibilities of the Foreman, Production, Costs, Employment, Safety, Training, History of Industry.

METHOD OF HANDLING The local group is given one unit in advance and they study it thoroughly before going to the discussion group or meeting. Usually some man in the concern who is an expert on that particular subject, which is assigned for consideration at the meeting, leads the discussion. Not only the material in the text but its applica-

tion to local problems is threshed out. Following the discussion, the men write out the answers to the questions appended to each unit and send them to the Extension Department office for criticisms and suggestions.

The Valley Mold and Iron Company at Sharpville was the first to make use of the new material. During the season of 1922 and 1923 many other companies followed suit.

REPRESENTATIVE GROUPS During the years of 1923, 1924, 1925, 1926 a wide interest continued in this form of Foreman Training. The United States Gage Company, The Middletown Car Company, The Erie Steam Shovel Company, The Hamilton Watch Company, The Lorain Steel Company, The National Tube Company, The United States Asbestos Company and the Lehigh Portland Cement Company are representatives of the firms who found this training profitable.

SUPPLEMENTARY LECTURES In order to make the work more complete many of the larger groups desired supplementary lectures for their discussion groups. Not only members of the Extension Staff but several members of the Industrial Engineering Department gave valuable assistance in this work.

APPLICATION TO RAILROADS The Lehigh Valley Railroad at Sayre was also among those who took the Foreman Training work. In 1926 Mr. Lyford of the Lehigh Valley Railroad suggested that a history of the railroad industry be substituted for the general history of industry already in the course

when offered to railroad employees. Not only was this done but a series of problems was developed to accompany the course. These problems require more initiative and originality than did the questions previously used, since they were distinctly railroad problems.

APPLICATION TO PUBLIC UTILITY COMPANIES The West Penn Power Company had been considering the Foreman Training work for some time but did not feel that some of the text was applicable to their men. Accordingly Professor Young of the Department and Mr. B. L. Fair of the West Penn Power Company completely rearranged the course to meet the new and special application. Again a special history for the industry was prepared by Professor Gaum. In January 1927, a group of 120 men using the new text was organized.

INTEREST IN PUBLIC RELATIONS In addition to the Foreman Training work dealing with the "bread and butter" phase of the foreman's job, wide use has been made of the course in Public Relations with foreman groups. The course has already been widely used by the Philadelphia Electric Company for their employees and by others, but by omitting those units dealing especially with public utility problems, it was made equally applicable to the industrial employee. In this course such things as Rent, Interest, Wages, Capital, Wealth, and the Business Cycle are studied. Among those to use this course are the Middletown Car Company and the Lehigh

Valley Employees at Sayre. Both of these groups had previously completed the course in Foreman Training. As a preliminary to developing this course a series of lectures on these topics was given to the Foreman of the Lorain Steel Company at Johnstown.

INDUSTRIAL MANAGEMENT FOR FOREMEN Professor George E. Mellon of the Industrial Engineering Department wrote a course in Foreman Training for executives in the employ of the Automatic Electric Company during his connection with that concern. This course with revisions was submitted to the Engineering Extension Convention in 1926. After criticisms and suggestions were offered by executives of plants where the course would apply, it was completely re-written and appeared under the title "Industrial Management for Foremen". This course is more technical than the preceding one and is designed for the executives in plants producing quantities of interchangeable parts.

INDUSTRIAL ECONOMICS During the summer of 1926, Professor Gaum of the Staff and Professor Sackett of the Economics Department at Syracuse University re wrote the courses in Public Relations or Utility Economics to make the entire course applicable to industrial employees. This course appeared under the title Industrial Economics in January 1927.

In using both the Industrial Management for Foreman and

the Industrial Economics, local group meetings of foreman are held, the material discussed, and lessons sent to the College for correction.

FOREMAN CONFERENCE Up to the fall of 1926 all the Foreman Training work that has been given through the Engineering Extension Department has been in the form of Foremanship classes for the study of text material and lectures. These methods had always met with a great deal of success but many industries were looking for something differing from the usual type of Foreman Training.

The successful use of the conference method for training foremen by several large corporations led to the employment of R. M. Holmes in December 1926, by the Engineering Extension Department to offer this service to the Pennsylvania Industries. Mr. Holmes had had previous experience in this work both with the Bell Telephone Company and the American Steel Foundries Company.

The conference method is based upon a thorough discussion of the subjects usually found in Foreman Training by a group of executives. However exceedingly timely, no lesson material is used and the conference leader is not expected to be a teacher or a disseminator of information. He throws the subject for discussion upon the table and endeavors by skillful suggestions and questions to create a "forked road" situations. These situations create discussion which is con-

tinued until the desired conclusions are arrived at.

Naturally, the conference leader must be a person of tact, humor, as well as being well informed on the subject under discussion. He should keep out of the discussion himself except as it may be necessary for him to change from one topic to another as soon as the discussion is complete.

The advantages of this method are that the results are more permanent because of the greater interest created and to the fact that the group naturally arrives at proper methods or policies.

SOME PROMINENT USERS OF THE METHOD The first company in Pennsylvania to avail themselves of this work with the Engineering Extension Department was the Armstrong Cork Company at Lancaster. Two groups of twelve executives each gathered for session. At the conclusion of these discussions, conference leaders were developed from those men to organize other groups and carry on the same procedure with minor executives in the plant.

Other firms to adopt this method in the early months of 1927 were the Griswold Manufacturing Company and David Luptons and Sons, (2 groups) Philadelphia. Auto Car Company, Mines Safety Appliances Company, John Lewis Sons & Brothers & Company.

Sample conferences were staged in Philadelphia, Pittsburgh, Reading and Erie, and the response has necessitated the

development of other conference leaders within the present staff of the Department.

It is not expected that the conference method of developing foremen will supersede the other Foreman Training courses previously offered by the Engineering Extension Department. There will continue to be fields for both and the new method only serves to round out more completely the services offered by the Pennsylvania State College to industry.

Although much more is heard of the work that the Engineering Extension Department is doing in Foreman Training than in some of its other fields of instruction, the field of Correspondence Instruction numbers by far the greatest number of students inasmuch as it includes many of those enrolled in Foreman Training, Industrial Economics, Public Relations besides the student who gets all his instruction through correspondence. It includes the Apprentice Training groups which send their lessons in for correction as well as the great number of individual correspondence students. With the growth of night schools, it would often appear that the field for correspondence instruction would be curtailed. This however, is not the case as one form of extension activity seems to increase interest in all forms of extension work.

CORRESPONDENCE INSTRUCTION

NIGHT SCHOOLS DEVELOPED FIRST The early work of the Engineering Extension Department consisted largely of securing the cooperation of local night schools, the organization of permanent night schools and the development of local home study groups. Prior to 1919 several students were enrolled for correspondence work. However, there was no organized section to take care of such study. Lesson material was much the same as used for local home study groups, and correction service was rendered by resident members of the engineering faculty. W. T. Elder, who had recently returned from the A. E. F., was employed to take charge of and to stimulate correspondence study. For several months Professor Elder was busy in outlining new courses, the collection of lesson material, and arranging for correction service.

HOME STUDY Up to this time it was practically impossible for an individual student to secure instruction in some particular subject in which he was interested. If there were ten or more students in his locality who wished to study the same subjects, the Engineering Extension Department arranged for such a group. With the development of the correspondence section every course which the Engineering Extension Department had to offer was available to the individual student. With such a condition, demands for various courses multiplied. Use was made of existing text books as a basis for the work.

Supplementary material was prepared and lesson assignments made ready. In addition to the strictly technical subjects there has already been a growing demand for correspondence in Accounting, business subjects, such as English for Business, and Business Law.

RADIO COURSES Interest in radio found the Engineering Extension Department ready with two correspondence courses in the study of the theory effecting radio communication. At one time more students were enrolled in the radio courses than in any other branch of the correspondence work. During the last few years, there has been a decided increase in the number of enrollments for other subjects such as Industrial Electricity, Milling, Metallurgy, Economics, and the like. The total number of courses available in 1926 was slightly over 120. All these courses had active enrollments.

CORRECTION SERVICE Originally, correction service was taken care of by members of the resident faculty. With the rapid growth of the correspondence work resident instructors were unable to take care of the correction service for the Extension Department. Accordingly, instructor after instructor was added to the staff to assist with the correction work. The correction work has always been deemed one of the necessary steps in developing men for promotion work in the Department. This policy has resulted in considerable shifting about of the personnel engaged in this work, but through it all a high grade of correction service has been maintained.

Each student is considered as a special case and every personal touch that is available in correspondence work has been introduced to make the student feel that he is getting personal service. No definite amount of time is allotted for the correction of a lesson report, and it is fully understood that all corrections must be accurate, courteous and inspiring. The coming of Professor James E. Davis to the Extension Staff in 1925 resulted in greater attention to this important work. The standard of correspondence work was raised higher and higher, more time was spent on corrections and a larger number of completions resulted, as well as better and more work.

REVISIONS Professor Keller was fully in sympathy with this program when he became Head of this Department in February 1926. Accordingly, members of the Extension Staff were put to work revising the various courses during the summer months. At the present time the correspondence courses are second to none offered through correspondence, either by commercial institutions or other University Extension services.

The number of students seeking correspondence instruction varies a great deal with business conditions. When work is plentiful men and women find more money available for correspondence studies, and they are in a mood to satisfactorily complete their courses. Probably the peak of the number of enrollments for correspondence work occurred during the winter months of 1924 - 25. It is not to be understood, however,

that the falling off in the number of correspondence students means that the total work of the Department is decreased. With the advent of the conference method for developing foremen many, men enrolled for this new form of Foreman Training, who would otherwise have sent lessons to the Department for correction service.

COMPLETIONS While most commercial correspondence schools attain a percentage of completions of but two to three percent, records over a number of years show that the number of completions at Penn State is unusually high. In some years as high as 30% of the men enrolled have completed their courses during the year. Others will complete their work the following year and eventually be counted as completed students. With the increase in the number of correspondence students, means have been devised whereby the person in charge of the office is able to follow up constantly the work of each student. Monthly progress reports are sent to the company where the student is employed, and personal letters are sent to the student in case his work is deficient or there is a temporary cessation of study.

CORRESPONDENCE INSTRUCTION IN CIVIL ENGINEERING

PENNSYLVANIA STATE HIGHWAY DEPARTMENT Although the Engineering Extension Department had been offering its facilities for home study and correspondence work to the members of engineering forces for several years, no organized effort was made to interest the employees of the State Highway Department until the fall of 1926. It is true that with the coming of Professor Daniels to the Department much expense and time was given to the development of Highway Courses. A good many men employed in the State Highway Department enrolled and completed their work, but as stated before there were no definite steps taken to bring the resources of the Engineering Extension Department before the members of the Highway Engineering forces until 1926.

PREPARATION OF MATERIAL Mr. Follin, Office Engineer, of the Pennsylvania Department of Highways brought to the attention of Professor Keller the field for extension work in his organization. Professors Keller and Davis and Mr. Hendrick went over the ground of instruction available for such men very carefully before presenting a definite program to Mr. Follin for his approval. It was decided that for the time being the Engineering Extension Department should give the more basic and fundamental courses such as Mathematics, Drawing, Surveying, and other courses of that grade. The Department of Highways was already conducting a school during the

winter for their inspectors and many of their engineers. At such meetings the results of the tests as prepared by Mr. Mat-timore of the Highway Department on the structural materials used in highway construction are discussed. Thus it was the feeling that the Engineering Extension Department should give the general work and that the Department of Highways would give their own instruction in processes and methods of construction and the more specific instruction as governed by Pennsylvania Highway specifications.

ORGANIZATION During the fall months of 1926, Mr. Hendrick visited District Highway Offices at Wellsboro, Erie, Kittanning, New Castle, Washington, Bedfore, Hollidaysburg, Bellefonte, Sunbury, Scranton, Harrisburg, Gettysburg, Philadelphia and Allentown, explaining the work which the Department of Engineering Extension had available. The response was immediate and local Home Study Groups were arranged for in each of the fourteen offices visited. A local supervisor from the District Engineer's Office was arranged for and the men began their study of subjects, which would materially improve their ability and chances for promotion. In addition to the strictly Highway courses many men were interested in College Credit instruction in Hydraulics, Structures, Machine Design, Structural Steel Drafting and Cost Accounting.

RESULTS It is still too early to determine the mass result of this work among the highway employees as many of the men

who enrolled for courses were furloughed from December first to April first, on account of a change of Governors, as well as the annual cessation of work during the winter months. However, it is true that the men who were retained by the Highway Department during the winter continued their studies faithfully and did an exceptionally high grade of work. Many of the men have received instruction which will raise them from rodmen and chainmen to transitmen. Not a few have been able to gather additional college credits which will allow them to return to Pennsylvania State College and other schools with advanced standing.

It is the opinion of the writer that the field of activities for the Engineering Extension Department among State Highway employees has only been scratched. With the hundreds of employees normally carried on the pay roll a large percentage have only the minimum of education required, namely, four years of high school. To men such as these the opportunity of getting a practical engineering education can not help but appeal. The State Highway Department has given splendid cooperation in this enterprise and has followed every project through from the start.

CITY ENGINEERS OFFICES With the same material in mind as presented to the State Highway employees, Mr. Hendrick made a hasty survey of the City Engineers Offices of the State and found that many of the same conditions were present there as

were found in the District Engineer's Offices. It is apparently the common procedure to develop their transitmen and chiefs of party from high school boys who have little or no idea in the beginning that they will make engineering work their permanent occupation. For such men as these the courses in Mathematics, Surveying and Structures are invaluable. During the month of December 1926, a home study group was formed from the employees of the City Engineer's Office in Altoona. Although the group was a small one, interest was at a high pitch from the first, and good work was constantly sent to the college for examination and criticism. It is the intention of the Department to carry these same facilities to all Pennsylvania City Engineers Offices during the coming years, the field of Civil Engineering instruction by correspondence perhaps having been overlooked at a time when most of the demand was for industrial subjects.

MINING COMPANIES Many of the coal mining companies of the state are also developing engineers from lads taken into their survey parties. Several of the same conditions are present there as were found with the State Highway Department and the City Engineers' Offices. Because of the fact that the college is able to offer thorough instruction in applied engineering work at a much lower cost than is required by commercial correspondence schools, the field for extension is **Practically unlimited.**

FUTURE PROSPECTS One of the first groups to be organized among the engineering forces was at Lansford, Pennsylvania, among employees of the Lehigh Coal and Navigation Company. A local supervisor was secured and the same procedure followed as with other Home Study Groups.

With the Pennsylvania State Highway Department developing a larger and larger program of road building, with the City Engineers' Offices an open field for Engineering Extension activities, and the engineering forces of the mining companies welcoming work from the college, the field of Civil Engineering subjects is unlimited. Although at the present time only one man is working specifically on these projects it will soon be necessary to devote more attention to this important phase of Extension work.

Closely allied with the Correspondence work, has been the College Credit instruction. Although most universities gave College grade work before giving any other work, and many universities never will give other than College work, Penn State gave the more elementary work first. College grade work was not to be ignored and as the demand increased, Professor Miller provided for this form of instruction.

COLLEGE CREDIT INSTRUCTION

EARLY WORK BELOW COLLEGE GRADE Despite the fact that Pennsylvania is essentially an industrial state and that the early work of the Engineering Extension Department was for men in the industries, and of a type that was intensely practical to be used on the job, many inquiries came to the college for College Credit Courses. After careful planning and numerous conferences with the heads of the departments concerned the Engineering Extension Department was able to secure permission to give some College Credit Courses to those meeting the College entrance requirements.

POLICIES PURSUED At the beginning Mathematics, Drawing, and various Engineering subjects were offered by correspondence. The regular college texts were used and the lesson material was prepared by either the resident instructor giving that course or a member of the Engineering Extension Staff who is a specialist in that subject. However, before any College credit course is offered by correspondence, all the lesson material for that course as well as the final examination to be taken at the completion of the course must have the approval of the head of the department concerned. In this way, there can be no question as to the parity of the courses offered by correspondence with those given in residence.

FINAL EXAMINATIONS The student who completes the lessons required takes his final examination proctored by a local school man who certifies to the Engineering Extension Department that there was no assistance given the student during the examination. If the student is successful in his examination, a record of the grade is sent to the Registrar's Office, as well as to the Dean of Engineering.

RESTRICTIONS Restrictions as to those who may take college credit work by extension are rigid and designed to set a high standard for the work given. In the first place the student must be able to meet the entrance requirements for the school of the college in which the work is given. If the student has been engaged in residence study at Penn State, he must have left the college in good standing in order to be eligible for correspondence work. Further, no student can enroll for a course in which he received a condition or a failure in residence study. The maximum amount of work that can be taken can not exceed one year of residence work. In special cases a man in industry is allowed to take a college grade course even tho he cannot meet the entrance requirements. However, in this he will not naturally receive college credit.

SUBJECTS NOW GIVEN Subjects offered in College Credit instruction now embrace work in many departments. A list of the subjects offered in January 1926 include Trigonometry, Analytic Geometry, Differential and Integral Calculus, Dif-

ferential Equations, Drawing I (French- Engineering Drawing), Descriptive Geometry, Shades and Shadows, Architectural Design, History of Architecture, Direct Current Theory, Electric Railways, Dynamo Machinery, Mechanics, Strength of Materials, Hydraulics, Highway Engineering, Structures, Railroad Engineering, Industrial Engineering, Metallurgy, Mechanical Engineering, Accounting, etc.

CORRECTION Correction service is performed by members of the Engineering Extension Staff or by the resident instructor in the subject.

SATISFACTORY RESULTS Experience at Penn State as at other institutions carrying this same type of work shows that correspondent students who afterwards enroll for residence instruction have done work of an unusually high grade. This is in sharp contrast to the pessimistic predictions of those opposed to granting credit by extension.

Many of the Extension Departments still give much of their service through lectures and little if any written work is required. In marked contrast, Penn State gave most of their instruction without the use of lectures, with the advent of the Department into Foreman Training and similar fields, lectures became necessary and were planned for.

LECTURE SERVICE

The Engineering Extension Department has never maintained a lecture service in the broad sense of the term. Although many University Extension Departments do a great deal of their work through lectures the Engineering Extension Department found its chief lines of work in industrial fields. From time to time requests came from local Chambers of Commerce, Manufacturers Associations, Y.M.C.A.'s, and civic organizations for speakers at their meetings. This situation developed a number of men in the department who could speak on the services that the Pennsylvania State College had to offer industry. Especially at commencement time among the Y. M. C. A. Night Schools were speakers in demand. Professors Miller Gaum, Young, Davis and Keller have addressed such groups many times.

FOREMAN TRAINING LECTURES With the rapid development of the Foreman Training work in 1924 many firms desired lectures to supplement the discussion of the text material. During the years of 1924, 1925 and 1926, Professors Miller, Gaum, Young and Elder were kept busy with these industrial talks. In addition to those lectures given by the members of the staff Professors Keller, Bullinger, Biese and Mellon of the Industrial Engineering Department were called upon for further lectures on specific subjects in their line.

ECONOMICS TALKS During this period Professor Miller developed a series of lectures on Economics subjects. Talks of the same kind were given by Professor Gaum to members of the Foreman Training group at the Lorain Steel Company in Johnstown during the 1925 season. Professor Miller had begun a similar series of lectures at the Griswold Manufacturing Company in Erie, when he was called to Rutgers. The material as used by Professors Miller and Gaum later became the nucleus of the course in Public Relations and Industrial Economics.

POPULAR TALKS The success of the lecture service was so complete that during the summer of 1926 Professors Keller and Gaum arranged a number of lectures which were available to industrial concerns. These lectures not only cover the more or less technical phases of manufacturing, but also cover the economics affecting industry. To these last Professor Gaum has added a number of talks upon popular subjects of the day such as "The Business Cycle", and "Family Budgets".

CHARGES In order to recompense the Department for this lecture service a nominal fee has been charged. This is always so low that it covers only a moderate fee for resident faculty members and travelling expenses. With the current interest in economics and the improvement of manufacturing processes this lecture service from an Engineering Extension Department has been in wide demand.

Professor Gaum has been closely identified with the lecture work from the beginning but it is also in the field of publications that he has made his influence felt. When large commercial correspondence schools spend millions for advertising, it can be readily seen that College Extension Departments must pay some attention to getting publicity for their projects.

PUBLICATIONS

In addition to the preparation of text material which is a constant recurring activity of the Engineering Extension Department, there are necessary catalogues and publicity matter, news stories and the like and this need was early recognized.

THE NEED FOR A NEWS SHEET With the rapid growth of the field of influence in the Engineering Extension Department, a monthly publication was planned in 1920, which would enable the Engineering Extension Department to keep in better touch with the students, to publish items of interest to extension students and to secure greater publicity for the work available through the Engineering Extension Department. This publication known as the Engineering Extension News, is sent regularly to all students in the Branch Schools, students in the Co-operative Schools, all correspondence students, and to educational directors, executives, as well as any persons interested in extension work. It may be had free of charge by making application to the Engineering Extension Department.

AIMS The Engineering Extension News aims to give timely items concerning the extension schools, educational developments, etc. An occasional class picture, a writeup of a local foreman training group, and personal notes concerning staff and student make the periodical of more than passing interest. Special articles, series of volume are a regular feature. The

success of the little paper has done much to make the correspondence student feel that he is a part of State College and is sharing its benefits. It has also created interest in the broader features of the work.

BULLETINS Bulletins describing special features of the Engineering Extension Department are issued from time to time. Each one is the size of the official college publication and is a part of the publicity of this division. A bulletin is designed to give specific information concerning some definite subject such as shop engineering, etc. Among the bulletins so published have been those describing Shop Engineering, Foreman Training, Public Relations, Industrial Relations, Technical Subjects by Correspondence (College Grade), Supervised Home Study. In 1927 the general catalogue was published covering all the written courses and activities.

SPECIAL BULLETINS For the benefit of large public utility companies like the West Penn Power Company, and the Keystone Power Company it has been the policy of the department to publish special bulletins describing courses pertaining to utility work. Among these are "Supervised Home Study Courses for West Penn Employees" as prepared by the Engineering Extension Department, Pennsylvania State College.

The interior of these bulletins are run off by the thousands as the same courses apply to practically all the utility companies. When such a corporation applies for information,

the appropriate cover is clipped to the sheets and the entire group shipped to the Utility for distribution to their employees.

NEWS STORIES In addition to the Engineering Extension News and the bulletins mentioned, the publicity men of the department prepare news stories of interest for the newspapers. All such material passes through the hands of the Department of Public Information before released to the press. During the Building Fund Campaign many stories of interest were prepared by Professor Gaum. In more recent years, features covering the Radio Courses at the College have been prepared as well as articles describing Industrial Economics Courses, Milling for the Technical Journals, etc. The Penn State Alumnus has published several articles describing in detail the work of the Engineering Extension Department.

NIGHT SCHOOL BULLETINS The small leaflets describing the courses given in the branch schools are also edited by the Editor of the Engineering Extension News. These leaflets have already been described under the Branch Schools.

NEED FOR MORE PUBLICITY The members of the promotion staff continually demand that more publicity be given to the work of the Engineering Extension Department. As they work about the state they find many individuals who are still in the dark as to what the College has to offer industrial concerns in the way of training for their employees. Moderate expenditures for publicity will increase the scope of the

department work.

Probably the Department has received more publicity in its work through the Engineering Extension Convention than through other mediums. It is exceedingly true that one can achieve more through actual experience than in any amount of reading. The Engineering Extension Convention is designed to give to a limited number a broad insight into the workings of the Engineering Extension Department.

CONVENTIONS

PURPOSE Professor Miller was constantly seeking better ways of acquainting the state with the educational facilities of the Engineering Extension Department. With this in view he issued invitations in the spring of 1916 to those throughout the state who were interested in extension work. Accordingly during the second week in May 1916 thirty delegates representing industries, public schools, Y.M.C.A.'s, colleges and personnel directors gathered to discuss extension activities. The gathering attracted wide comment throughout the state as many valuable papers were read by men such as by former Dean Jackson and Director James A. Moyer of the University Extension of Massachusetts. Thus came into being the first Engineering Extension Convention. The discussion of common problems of the Engineering Extension Department and the industries which it was striving to serve resulted in many valuable features. As the Convention was held from year to year representatives of industry laid before the Convention their special problems and needs in an educational way. In this manner the Engineering Extension Department entered the field of Foreman Training work, Industrial Economics and Railway Trainmen's Course. This may all be summarized by saying that the Engineering Extension Convention is a means of discovering new fields for service.

EVOLUTION OF LESSON MATERIAL When the demand for certain

material or courses arises the Engineering Extension Department immediately prepares at least a rough draft of material for such a course. From the maze of discussions upon the subject the staff with its consultants, boil down the essential outline of the tentative course. At the Engineering Extension Convention held the following year the material based on the outlines is submitted to the men present for their criticism and suggestions. These suggestions and criticisms are always forthcoming and result in the course being rearranged and perhaps rewritten to meet the needs of industry as these representatives see it. The advice of the men who have attended Engineering Extension Conventions is priceless because it represents calm judgment, and the long experience that they have had in dealing with human material.

DISSEMINATION OF FACTS CONCERNING THE COLLEGE It has not been possible for the Engineering Extension Department to bring to the attention of Industry all the facts regarding the College which it has had at its disposal, but when these representatives come to the College every year during the month of May they realize more and more the wonderful opportunities which the College is offering their employees. It gives them the chance to meet again the field representatives of the Engineering Extension Department and it also enables them to become acquainted with the men in the office who are directing and conducting the correction service. It also enables them to meet members of the

resident engineering faculty, and to learn more of the college and its facilities. Since 1924 the Conventions have been held at the Centre Hills Country Club, located three miles from State College. With the beautiful Mount Nittany in the distance and the big out doors all around the spacious club house these representatives of manufacturing concerns are at ease and enjoy a period of relaxation. At such times it is possible for the members of the Engineering Extension Department to meet informally the men who will be helpful in organizing the home study and various other groups during the following winter.

CONDUCT OF CONVENTION The Conventions always last for three days, usually Thursday, Friday and Saturday. Thursday morning is spent in registration of the delegates and assigning them to rooms usually with members of the faculty. The first afternoon is spent in more or less formal welcome to the College usually given by the President of the College and R. L. Sackett, Dean of Engineering. The afternoon session does not last very long, and the delegates are given a chance to stroll about over the campus and learn of the institution first hand. Then in the evening dinner is had either at the University Club or at the Country Club. This dinner is always followed by several short addresses on topics of educational interest.

The first real day of work comes on Friday. The entire Convention moves bodily to the Country Club. During the morning session more or less general topics concerning Extension acti-

vities are discussed by representatives of the industries themselves. Strong and weak points in the work that the Engineering Extension Department is doing are brought out. At this meeting it often occurs that the need for new courses is first suggested.

Luncheon is had at the Country Club and the usual Convention picture is taken. After this there is an opportunity for devotees of golf to practice their game while the rest lounge about the veranda overlooking the broad valley. About two o'clock Friday afternoon the Convention reassembles but this time for sectional meetings. The instructors, the secretaries and all those interested in the night schools work together in one part of the building to discuss their problems. Questions of attendance, text material, commencements, etc., are discussed. Another section will be composed of delegates interested in Foreman Training, while others will be occupied with Economics, Home study, and apprentice Training. Each of these sections will discuss in an informal manner the success which they have had with that kind of work.

Following the Convention session there is another chance for another get-together about the club house, and the members of the Extension Staff are always kept busy answering questions about this plan or that. In the evening a banquet is served in the dining room of the Club. At this time one or two inspiring addresses are given by representatives of

the leading industries. Speakers at this dinner have been for the most part men from outside the state and include Professor Ben G. Elliott of the University Extension Service at the University of Wisconsin, Robert B. Binkert, Chairman of the Committee on Public Relations for the Western Railroads, Howard Elliott who is President of several Transcontinental Railroads and Francis V. Pratt, Vice President of the General Electric Company in charge of Engineering.

LINING UP PROSPECTS The Saturday morning session is made up of conferences between members of the Extension Staff and those delegates to the Convention who have some difficulties in their plans to talk over. Often times during the Saturday morning get-together, arrangements are made to begin educational projects in various plants throughout the state early in the next fall. With the limited facilities of the Department in comparison with the scope of the field, this arrangement is exceedingly necessary as the promotion men are then free for other projects.

GROWTH From the thirty men who in 1916 attended the first annual Engineering Extension Convention the number has steadily grown to over 150 attending in 1926. During the war there was a necessary suspension of such a meeting, but following the war there has been an indreasing demand for them. It is not going too far to say that the Engineering Extension Convention is one of the leading features of the Engineering

Extension work. Through the contacts made at this **Annual** meeting the work of this Department has spread from one end of the state to the other and various new fields of endeavor have been pointed out. At the same time interest has been created in the institution itself, and these delegates carry back to their communities glowing reports of the facilities which the School of Engineering has to offer industrial employees through the Department of Engineering Extension.

INAUGURATED AT RUTGERS That this work of the Convention is so necessary is evidenced by the fact that one of the first features that Professor Miller introduced after going to Rutgers University was to plan for an Industrial Extension Conference to be held at New Brunswick the following fall.

SHORT COURSES AND CONFERENCES

FIRST CONFERENCE The Engineering Extension Department entered the field of Industrial Conferences in January 1927, when an Industrial Electric Heating Conference was held at the College. The need for such a meeting was brought to the attention of the Department by Wirt S. Scott of the Westinghouse Electric and Manufacturing Company. Purdue University had already held similar conferences. Under the immediate direction of Mr. Roy S. Kerns, Metallurgist of the Extension Staff, a program was prepared dealing with the various applications and problems connected with the use of electric heating in industrial operations. Invitations to attend were sent to all firms using metallurgical processes.

MATERIAL COVERED Dr. Hetzel, newly elected president of the Pennsylvania State College welcomed forty representatives of industry at the conference which opened on January 11. At other sessions, papers covering foundry practice, the electric heat treatment of steel, and the present as well as possible use of electricity in heating processes was discussed. Not only were Pennsylvania industries represented but also out of state corporations such as Dodge Brothers, Inc., Pratt and Whitney, etc.

OTHER SCHOOLS COOPERATED Cooperating with the Engineering Extension Department in this enterprise were the Schools of Mines and Metallurgy, School of Chemistry and Physics, and various Departments of the Engineering School. The success-

ful operation of this Conference indicates that the College through the Engineering Extension Department is able to meet the demands from industrial problems and the publishing of information concerning modern methods of practice.

PERSONNEL

The history of Engineering Extension at Penn State would be incomplete without mention of the various men who have been with the work since its inception. The following account of the personnel will suffice at this point, the projects carried on at various stages being treated elsewhere.

The first Evening Engineering Class was organized in Williamsport by Dean John Price Jackson in 1910. Mr. G. D. Barbey of the Williamsport School was the first Engineering Extension Instructor in the State. Mr. J. W. Hale, an instructor in Electrical Engineering was detailed in 1911 to supervise the Apprentice Classes at the Altoona Shops of the Pennsylvania Railroad.

Professor James A. Moyer came to the Pennsylvania State College as Professor of Mechanical Engineering in 1912. His experience with Dean Jackson in organizing the Allentown School made him the logical leader of the Engineering Extension work following Dean Jackson's appointment as State Commissioner of Labor and Industry.

In 1914 Mr. A. T. Brown of the Mechanical Engineering Department gave lectures for the Engineering Extension Division and in following years Professor Markle, Professor Diemer, Professor Brown and Professor Fessenden carried on the series. In 1913 Mr. C. G. Gaum of the Mechanical Engineering Department became the first field representative of the

Engineering Extension Division. Mr. R. H. Spahr took Mr. Gaum's place in 1914 when the latter left to take charge of Fels and Company classes. In January 1915, N. C. Miller of Mechanical Engineering Department entered the Extension field.

In the spring of 1915, Mr. Spahr resigned. In the fall of the same year, Professor Moyer resigned to accept a position as Head of the University Extension work in Massachusetts.

RE-ORGANIZATION About this time R. L. Sackett was appointed Dean of Engineering and became Director of Engineering Extension with N. C. Miller as supervisor. Charles F. Kopp, then an Instructor in Mechanical Engineering was then added to the staff. Mr. Kopp resigned in 1916 and Mr. M. M. Walters took his place. On January 1, 1916, Mr. C. G. Gaum returned from his leave of absence, thus giving the Division three full time instructors. In 1917, Mr. Gaum and Mr. Miller secured leave of absence on account of war activities. Mr. Walters remained until the spring of 1918 when he also resigned. This brought the personnel to zero.

WAR INFLUENCES Mr. Miller secured his release from the Training Department of the Ship Yards at Bristol in During that winter Mr. T. R. Coggeshall formerly at Girard College was employed to re-develop the Philadelphia section. The following February, Lieutenant W. R. Young joined the

Department. The following summer the first full time stenographer was employed. Mr. Soley joined the field forces of the Department for a few months in 1919. W. T. Elder just discharged from the A. E. F. joined the Department in 1919 to take charge of the division's newly created section of correspondence instruction. Mr. Coggeshall's services came to a close with his sudden death on a train to Philadelphia. Ensign Gaum now relieved from active duty in the Navy took over the work Mr. Coggeshall had been doing. In 1920, two additions were made to the office force and H. L. Reichelderfer was employed for field work. In order to develop the College Credit Instruction, P. A. Daniels formerly assistant Chief Engineer of the Greenville Division of the Bessemer Railroad was added to the Department.

Mr. F. N. Catherman came to the Department in September 1923 to assist with both the office and field work. This allowed Professor Elder to devote more time to field work.

In September 1924, L. W. Charters and W. T. Morrow were added to the Staff to assist with the night school work. F. L. Hendrick was brought in for both correspondence instruction and field work. Mr. Charters resigned on January 1, 1925, and Mr. Morrow resigned on February 1, 1925.

During the summer of 1925, E. N. Montague and D. C. Bratton were employed to assist Mr. Chaffee in the night school work. H. G. Pyle was employed to handle the correspondence

service and Professor James E. Davis from Drexel Institute, formerly a member of the Mathematics Department at Pennsylvania State College took charge of the office work.

PROFESSOR MILLER RESIGNS Professor N. C. Miller, Head of the Department resigned on November 10, 1925, to become Head of the Industrial Extension Department at Rutgers University. On January 1, 1926, Professor W. T. Elder resigned to go with Professor Miller. On July 1, 1926, Mr. Chaffee also resigned to go to Rutgers.

About January 1, 1926, Roy G. Kerns was brought to the Department to develop courses in Metallurgy and Heat Treating. E. L. Keller was employed to assist with the night school work.

Professor J. O. Keller, Head of the Department of Industrial Engineering at Penn State was appointed Head of the Engineering Extension Department on Professor Miller's resignation but did not take office until February 1 of the following year, the Department work in the meantime being in charge of Professor Gaum.

On July 1, R. W. Roop was employed to assist with promotion work, R. T. Kriebel to assist in publicity work, and E. O. Keller to assist in the night schools. Mr. Keller became subsequently the first director of the Erie Branch School.

On September 1, 1926, Professor Davis resigned to return to the Department of Mathematics at Drexel Institute. On

November 1, 1926, F. N. Catherman left the Department to enter commercial work. The resignation of these two men resulted in a realignment of departmental forces. H. G. Pyle took the place of Professor Davis and F. L. Hendrick was definitely assigned to the promotion branch to develop the course for State Highway employees.

I. C. Boerlin came to the Department on September 1st, 1926, to assist with the correction services and to revise the Radio and electrical courses. On December 1st, 1926, R. M. Holmes, formerly with the American T. and T. joined the Department to develop the conference method of training foremen. During December and January Robert Parnell, M. T. Bunnell, John A. Henry, were added to take care of the increasing correction demands. The former two are both graduates of the School of Liberal Arts at Penn State and assisted with the rapidly growing courses in nontechnical subjects such as Business Law, Accounting, Business English, etc.

RAPID TURNOVER To the casual observer, the above enumeration points are that in the thirteen years of the Departmental existence that a great many men have been connected with the work and that some of them have stayed with the Department only a very short time.

QUALIFICATIONS OF EXTENSION SPECIALIST The Extension specialist is an individual whose value increases with his contacts throughout the state as well as the technical knowledge that he possesses. The prevailing idea is that an ex-

tension specialist must be developed before he is of much value to the Department. With this view in mind it has been the custom to take into the Department a large number of young men especially recent graduates from technical schools. These men are assigned to various tasks about the office which will bring them into close association with the work and thus enable them to know fully the facilities which the Department has to offer. These tasks may consist of keeping records, caring for stocks text material and supplies, the correction of papers, preparation of reports and charts and the writing of some newspaper articles. After several months of such work, which often appears to be more or less menial tasks, the man is sent out with an experienced promotion man to get field experience. After several trips of this character he is assigned to call upon individuals where there is usually a favorable chance of beginning a local home study group of some description. As the man gains experience he is assigned to other calls which are increasingly difficult. Often times these calls are bound to be very disappointing, and the new man would become thoroughly discouraged if he had not already made some favorable impressions.

The specialist in the Engineering Extension Department must be skilled in some form of educational activity, such as Foreman Training or Economics, but furthermore he must have

developed the art or science of organization. He must have a pleasing personality and he must be an earnest worker as well as being thoroughly familiar with the work he is offering. Naturally, as a man travels up and down the broad state of Pennsylvania he meets hundreds of executives, some of whom no other men in the Department will meet. These contacts are exceedingly valuable as they help the promotion man to go into various plants and organize the groups which are necessary to the success of the Department. The reader will note that the same qualifications are necessary for the man who is assigned to organize work in the night schools as with the foremen of home study groups or the arrangement for lecture service in industrial communities.

OTHER FIELDS CLAIM EXTENSION MEN From all the men who have been connected with the Engineering Extension Department up to the time of Professor Miller's leaving only Professors Gaum and Young and Mr. Hendrick remain. Many of the other men stayed only a very few months, and others remained for a couple of years. This rapid turnover is partly due to the fact that the newer men especially are able to get better salaries in commercial fields than with the college. The extension work takes the promotion man out of town a great deal and if he is a man with a family there are many objections to this type of work. Hence, it is not at all surprising that many of the younger men remain only a very short

time. The extension work is very exacting and requires every bit as much ability as resident teaching, and there have been instances where men have been unable to keep up with the standards set for them. Specialists who remain with the Extension Department long enough to get a broad view of extension work have not found it difficult to find work in other states at larger salaries. Notable among these are James A. Moyer, who left the Extension Department to become Director of Extension at Massachusetts. Mr. Spahr left shortly after Mr. Moyer to go into the same Department. Professor Miller left in 1925 to Head the new Industrial Extension Division at Rutgers University. He took with him Professor Elder and Mr. Chaffee. Mr. Walters who was at one time an instructor in Engineering Extension became Head of the Vocational work in Bethlehem, and later returned to Penn State in the Department of Vocational Education.

With the promotion and organization experience gained in Extension work many of the young men have found it advantageous to go into the commercial selling. These men have gone to bond houses, manufacturers of building material and the like. There is no doubt but the extension experience is valuable to more men as it develops poise and ability and requires that the man be alert every minute.

PENN STATE A TRAINING SCHOOL Professor Keller looks at the situation the same as Professor Miller did in that

the Engineering Extension Department at Penn State should continue to be a training school for extension men. With the rapidly increasing demand for Engineering Extension service at other Universities, Penn State will continue to produce men who are specialists in some particular field, and who are capable of taking greater responsibilities at other institutions. The fact that Penn State was the first college in the country to develop an Engineering Extension Department and at present is looked to as the foremost school in the country for that type of instruction makes the Engineering Extension Department a wonderful training school. With the various types of industries in which Pennsylvania abounds the man gets training in many fields and a wealth of experience in dealing with executives as well as with the great body of industrial workers.

RESULTS OBTAINED

In any educational work among adults it is exceedingly hard to choose a yard stick with which to measure results. Inasmuch as the average student in extension activities completes his work over a period of time, results are gradual and in some cases intangible.

Statistics in themselves are of little value as they can be manipulated to show about any result desired. Probably the best criterion of the success of the Engineering Extension Department is the ever increasing numbers of firms who are turning to the Department for assistance with their educational problems.

FOREMAN TRAINING Probably the work that the Engineering Extension Department has done in Foreman Training is its most outstanding work. Beginning in 1923 with the group at the Valley Mould and Iron Company the idea was accepted by the following groups in 1924 and 1925:

National Tube Company

Hamilton Watch Company

U. S. Refractories

Elk Fire Brick

Floyd Wells Company

William Wharton Jr.,

Thomas Lupton & Sons

Middleton Car Company

Lorain Steel Company

Lebanon Paper Box

American Car & Foundry

Mack Truck Company

Pottsville Y.M.C.A.

Lehigh Valley R.R.

Athletic Steel Castings

In 1923 and 1926, the number of Foreman Training groups operating dropped to nine including:

Lehigh Valley

Middleton Car Company

Bessemer Gas Engine Company

National Tube Company

Virona Steel Castings

U. S. Asbestos Company

Lukens Steel Company

Erie Steam Shovel Company

In 1926 and 1927 the following Foreman Training groups were organized:

West Penn Power Company

Hookless Fastner Company

National Transit Power & Motive

Chicago Pneumatic Tool

There is apparently a decrease in the amount of interest in such projects but this is not at all due to lack of worth

while material in the subject. Experience within the Department has established the following relations:

1. Foreman Training groups in the same industry cannot be repeated except at wide intervals. A course in Foreman Training reduces turnover of employees and it is useless to give a man the course a second time.
2. The number of firms interested in Foreman Training varies from year to year regardless of business conditions. When work is slack, men have the time for study but not the money to pay for the courses. In the periods of high production, the men work overtime and have no time to study.
3. Each industry must be promoted individually although all foremen exercise certain basic fundamentals, details for each group must be worked out especially for that industry.
4. The limited promotion force can handle only a few plants each year. When the man in charge of promotion divides his prospects among other promotion men, certain prospects may require as much work as others and yet yield no groups. In other words, only a limited number of firms can be visited and some of these are only inquisitive and not seriously interested.
5. The value of Foremanship Training cannot be gauged by the number of firms using it from year to year. As pointed out above, conditions over which the department has no con-

trol effects the number of firms which are willing to go into training projects.

The Engineering Extension Department has received signal recognition from both state and national bodies for its Foreman Training. The National Chamber of Commerce made an investigation of the Foreman Training facilities of the country and recognized the Engineering Extension Department of the Pennsylvania State College as one of the leaders in the work. During the winter of 1927, Mr. G. L. Foss, Secretary of the Pennsylvania State Chamber of Commerce made a personal investigation of the work done by the Engineering Extension Department and placed approval on the work.

To a certain extent, the success of an enterprise can be gauged by the number of firms repeating the course a second time. The Lehigh Valley organized a group at Easton following their success at Sayre. The Middleton Car Company followed their course in Foreman Training with one in Industrial Economics. The U. S. Refractories Company at Mt. Union is now promoting a second Foreman Training group which will include foremen from the other Refractories Companies in the same town.

The Engineering Extension Department has never tried to solicit testimonials from firms using their work. However, many expressions as to the value of such training come unsolicited. Of the 40 odd groups, a large number have had every

man finish their course. This is especially true of the smaller groups.

The Industrial Economics has been out such a short time that it is impossible to give any statistics. With any new course, there is always a wave of enthusiasm, which may include some who should not have taken the course.

The Foreman Conferences begun in December 1926 have been completed only at the Armstrong Cork Company in Lancaster. 24 men completed the work and from these, four men have been trained to conduct further conference groups in their plants.

The Engineering Extension Department has never conducted any groups in Public Relations. The policy of most of the large utility companies is to purchase the material and carry on their own classes. This of course relieves the College of all responsibility for results except as there may be mistakes in the text material.

The College credit institution has not grown in keeping with the rest of the facilities of the Engineering Extension Department. This is primarily due to the fact that the number of students seeking College credit work is limited and there are no end to the number of institutions giving College grade work. However, in 1924-25, 23 students completed 57 hours of credit. The results of the work given however, have been very satisfactory. Experience has shown that many of the students who have taken College work in absentia have

done exceedingly high grade work later in residence. One student in 1927 who took College trigonometry and descriptive geometry by correspondence won the Louise Carnegie Scholarship in his Junior year.

The correspondence institution includes the lessons prepared in Foreman Training, Supervised Home Study, and Affective Training. Since the beginning of correspondence institutions 6217 courses have been taken and 53,372 lessons have been corrected. This leaves a total of 20,854 lessons for which the department is obligated to give correction service.

Drawing I on Page 83 shows the growth of the work in the Department for 15 years. Unfortunately this shows only the enrollments and not all completors. In 1924 there were 3678 students and 1037 completors; in 1925, 4103 enrollments and 1116 completors; and in 1926, 4363 enrollments and 1213 completors. Thus for the last three years there has been an excess of 30% in completors. When one considers that the average commercial correspondence school has a completion of only 2% it can be realized the good work the Engineering Extension is doing. Furthermore, the percentage of completions through correspondence work is almost as large as those who complete their college courses. This is in spite of the fact that the difficulties of extension work are greater than those in College.

NIGHT SCHOOLS It is even harder to estimate the results

of the night schools than the correspondence work. We do know however, that the branch schools especially are supplying their respective communities with a high grade of technical men. The textile plants of Allentown and Reading are full of graduates of the branch schools there. These two towns are largely Pennsylvania Dutch in character and the students finish what they begin. The textile industry pays splendid wages and the course in textile Engineering directly applies to the men's work. In Scranton and Wilkes-Barre most of the graduates are employed as engineers and designers by the mining companies. Naturally the popular courses there are mining Engineering and Civil Engineering. Williamsport has now operated for 2 years and has not had time to justify or condemn its continuance. The same is true of Erie branch which opened in the fall of 1926.

A few figures on the night schools however, may prove interesting:

<u>NIGHT SCHOOLS</u>			
Year	1924	1925	1926
Enrollments	3040	3179	3258
Completions	2321	2432	2486

In the season of 1926-27, the Reading Branch School had a completion record of 67%. The graph of the attendance at this school is at the back of the manuscript.

CONCLUSION

MEANS OF SUPPORT FOR AN EXTENSION DIVISION The Engineering Extension Department from its initiation has had a state appropriation for carrying on its work. However, this appropriation has never come anywhere near meeting the actual cost of operating the Department. This situation brings to a focus one of the important policies in carrying on Extension work and that is the extent to which the State must contribute to the support of the such activities.

An analysis of Dean Louis Reber's paper of the University of Wisconsin in the Journal of the Department of Education in June 1914 shows that the majority of the extension departments depend upon the student to carry a large share of the cost of conducting the course. This is in keeping with the practice of Professor Miller who believed that the best interests of the student were also served in having him pay a portion of the cost. Experience with a few correspondence courses offered by some manufacturers to their employees free of charge showed that the student appreciated courses more when he had some financial interest in it. This method also carries the argument that at any rate the appropriation from the state will be limited and if the student coes carry a portion of the burden, it will be possible for the Extension Department to reach more students and to develop its applications more fully.

In contrast to those Extension Departments which receive a State Appropriation, there are certain Universities which must carry the full burden of extension by fees from the student body. This method is an injustice as it places a premium upon commercial methods of organizing groups and the profit side of the ledger must constantly be watched. With such a plan, student fees must be higher and all costs must be reduced to a minimum even though the service to the student must be curtailed.

The more enlightened and fair policy is for the State to assist in carrying the burden with the student on a fifty-fifty basis. Thus if the budget for the department were \$50,000 the State would provide \$25,000 and the remaining \$25,000 would come from fees. Unfortunately this ratio has never been carried out with the Engineering Extension Department at Penn State. In 1925 when the State appropriation was only \$17,500 the total budget for all the activities was \$55,000. This is more nearly in the ratio of one to two. In 1927, the total budget was \$66,000 of which only \$17,500 was provided by the State. However, it is hoped that the present legislation will provide at least \$40,000 per annum for this work.

SOURCES OF INCOME If the State appropriation is deducted from the total budget, all the remainder must come from fees from the student and the sale of text material. The sale of text material although heavy does not bring in a large

amount of actual profit. In the past, the Y. M. C. A. co-operative schools have been the largest customers for such material and in connection with the purchase, the Engineering Extension Department gave a supervisory service. This has been done away with to a certain extent but the total profit from all such material would not exceed \$500. in the course of a year.

Student fees must bear the brunt of the cost of maintaining an Extension Department. In this matter as in other commodities, fees must be reasonable enough to yield the maximum total amount and in every case the individual fees must be sufficient to cover the correction service. In order that student fees may be depended upon year after year, certain definite institutions must be perpetually maintained. Among these are the permanent night schools. Here in Pennsylvania are local branch schools in six of the larger cities and year in and out they will maintain an enrollment of 700 students. These students pay \$30. each year for their class instruction so here is a yearly sum of \$21,000 at least. Under proper management these permanent night schools will have a balance of \$4,000 to \$6,000 at the end of each year. It is no wonder then that Professor Miller and Professor Keller both insist that the permanent night schools are the back bone of Engineering Extension in an industrial state.

After deducting the fees from the night schools and the State Appropriation from the total budget, approximately \$30,000

must come in from group projects such as Foreman Training or Industrial Economics or Supervised Home Study. The office manager who also has charge of correspondence with prospective students, will receive on an average \$8,000 a year from miscellaneous enrollments which come through the mail. This leaves a total of \$22,000 which comes from group projects. When the Foreman Training is put on at \$15. per student, this means that 1500 men must be enrolled per year in Foreman Training or its equivalent.

The Engineering Extension Convention does not bring any fees into the treasury except as they are used to pay for entertainment, etc. The conferences such as the First Industrial Electric Heating Conference also brings in no fees. In marked contrast with this, the Industrial Management Conference held for two weeks in June in conjunction with the Industrial Engineering Department provides enough fees to maintain the course and provide good board and lodging for the executives who attend.

COMMENTS. The writer has tried to make clear in the above paragraphs that student fees must be relied upon and they must be made fairly sure of from year to year. In order to do this, the permanent night schools and Foreman Training projects apparently provide these requirements. Although the Department has enjoyed a large number of enrollments in Radio and also in Milling Engineering, these courses must be looked

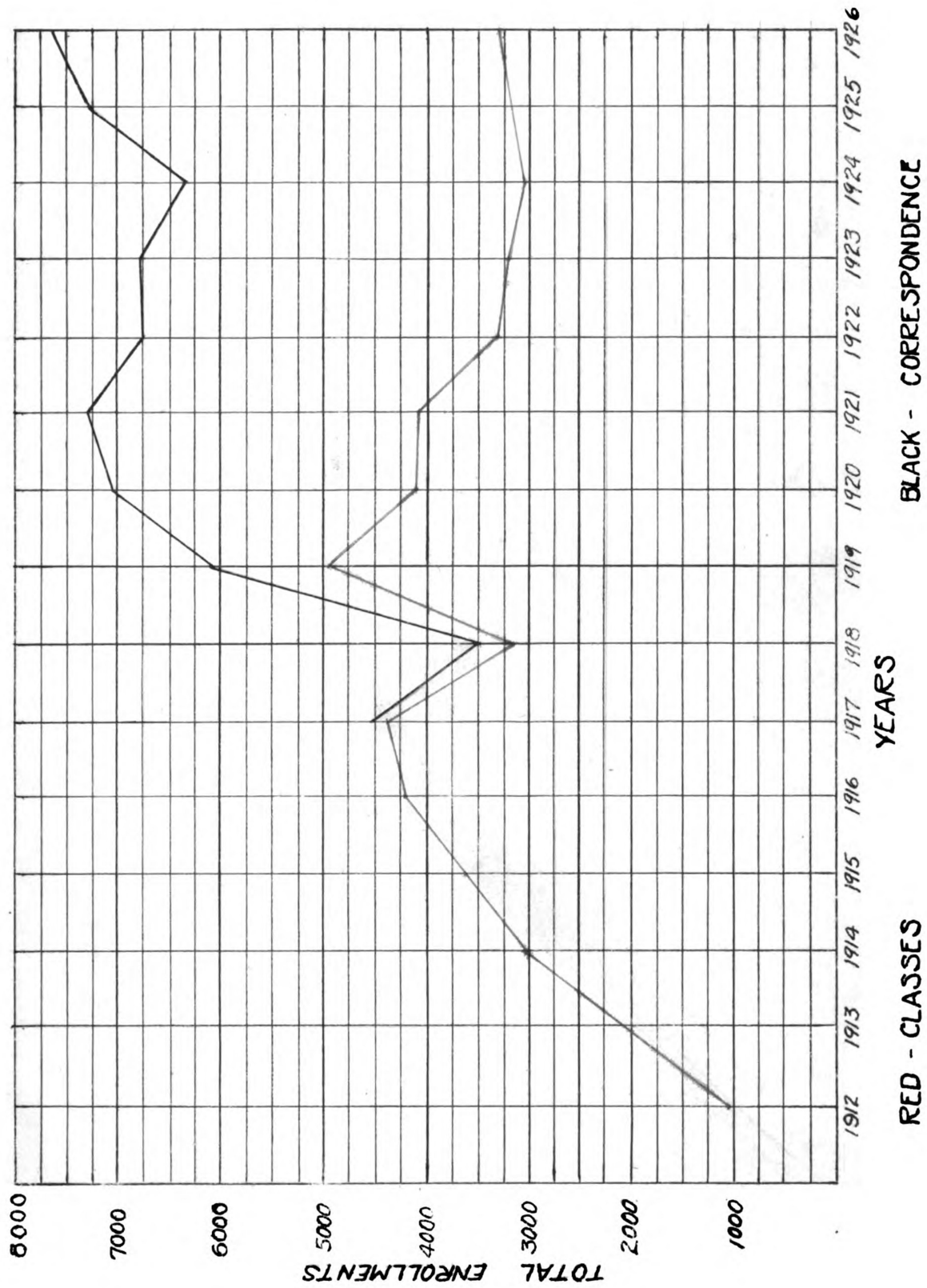
upon as popular for a short time only and cannot be relied upon for a very long period.

SUPPORT OF THE FACULTY Any Extension Department must have the backing of the State in its program. If this Department is a Division of a college, the Board of Trustees must give the Extension work its full support. But going even further, the particular school of the college must give the Extension Department its full co-operation in preparing new courses and in giving service to the correspondence student. Here at Penn State Dean R. L. Sackett of the School of Engineering is also Director of Engineering Extension. This is indeed a fortunate arrangement as it makes it easier to get assistance from the resident faculty. However although all department heads have given co-operation when desired, many individual members leave much to desire when working out extension projects in their own field.

WILLINGNESS TO SERVE The wide awake Extension Department will find more opportunities to serve than it has facilities to meet them with. However, the head of such a service must convince all those seeking his help that the Extension Department will assist in any such work just as far as its facilities will permit.

The field of adult education is still very largely uncultivated and as soon as the masses realize that the college can help them they are going to ask for new projects. The

Extension Department should be in a position to gauge such situations correctly and plan the work that is desired, provided of course that such work is feasible. Commercial schools are keen to sense such opportunities and although their work in general is excellent, the college should do more and more of this work as it is able to give better work and to put it out at a more reasonable cost.



% Attendance — Reading Branch School.

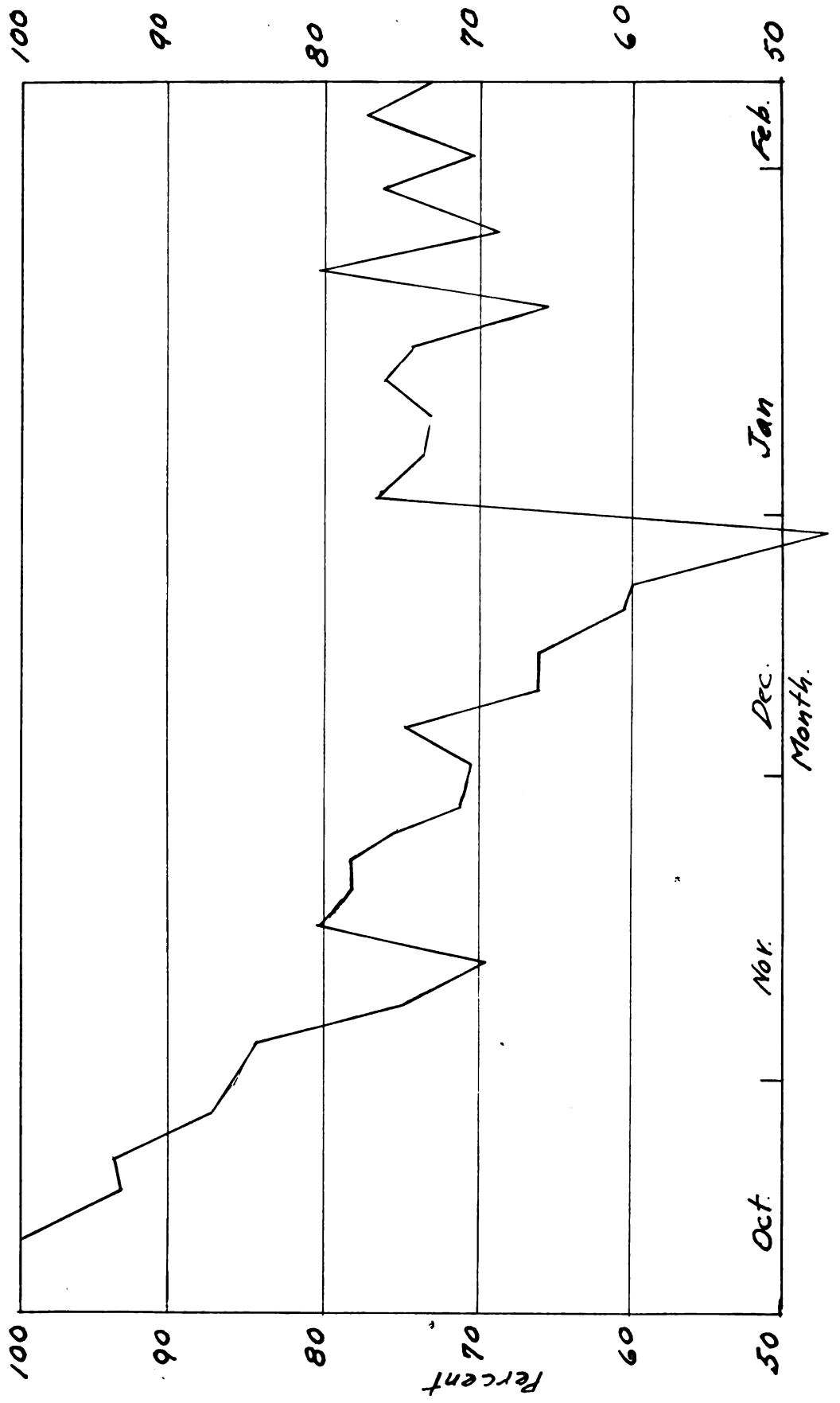


Diagram Showing Distribution in Pennsylvania of Centers where Engineering Extension Work of State College is Conducted

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