

# ISEP (Instituto Superior de Engenharia do Porto): Identity of a School with Roots in the 1800's

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## ABSTRACT:

The forerunner of ISEP was inaugurated on 27th. March, 1854 with the designation of "Industrial School of Porto" (*Escola Industrial do Porto*). In 1864, the Industrial Institute of Porto (*Instituto Industrial do Porto*) was created, closely modelled on its namesake in Lisbon. Emídio Júlio Navarro was responsible for the Decree which, on 30th. December, 1886, ordered the reform of industrial training in Porto, establishing new courses specially in commerce. From 1886-87, the Institute was organized into two departments: the *industrial* section and the *commercial* section. After the First World War, technical training was completely reformed so that the I.I.C.P. was divided to create the Industrial Institute, the Commercial Institute and the Higher Institute of Commerce. In 1924, the two branches of secondary education were again merged, allegedly to streamline resources, thus creating the I.I.C.P. (1924-1933).

In 1933 with the *New State*, the Industrial Institute of Porto (1933-1974), definitively made commercial training autonomous and moved from the installations in the Porto University building to the building of the extinct Faculty of Letters. It was only on 19th. June, 1968 that the Paranhos centres (Rua de S. Tomé) were inaugurated. In 1988, ISEP became part of the structure of the Polytechnic Institute of Porto (*Instituto Politécnico do Porto*).

## KEYWORDS:

Technological Education, Industrial Institute, ISEP, Engineering.

“(...) Industrial Institutes are schools with a long history which have trained generations of professionals who, without doubt, have contributed fundamentally to the development of Portuguese industry. (...)” (Decree-Law 830/74 of 31<sup>st</sup>. Dec).

The integration of the old Institutes within the realm of higher education, as legally and administratively independent schools, demonstrates the recognition of their educational and economic roles, their historical inheritance and their place within the sphere of the training of qualified productive and responsible citizens. More than the bestowal of an emolument, it is the acknowledgement of their place within the context of development and their contribution to technical and economic progress. It is, furthermore, the social certification of their capability to train staff and respond to the expectations of those who seek them.

#### PERIOD OF CONSOLIDATION OF INDUSTRIAL TRAINING (1851-1910)

“(...) The aim of the Associação Industrial Portuguesa (Industrial Association of Porto) is the development of national industry — education of the industrial classes, particularly the labourers, in the basics of arithmetic, geometry, design, mechanics, chemistry and physics and especially in the study of machines, instruments and processes

which have successively been invented or perfected so that the Portuguese industry is on par with more advanced nations (...)” (Bylaws of the A.I.P., 1852).

This clear desire of a private institution, representative of one of the entrepreneurial centres with the greatest potential for growth during the 19th century and, following various vicissitudes, with bylaws passed by the politicians, clearly shows the urgency to “instruct the industrial classes”. The ratification of the bylaws of the Association’s Industrial School on 31st October and their inauguration the following month, on 22nd November, 1852, reiterates the desire to go forward with a type of education whereby national production would become more competitive.

With this initiative, it is important to consider not only the capacity of foresight of an entrepreneurial association in comparison to the State (the legislation regarding industrial education dates back to 30th. December, 1852), but also the pupils’ rapid adherence to this private enterprise. One special feature which reinforces the importance of this initiative for the 117 pupils enrolled in an unexpected scholarship clearly shows that, not having attended primary school or even having attended but still having difficulties with the Portuguese language, they understood that this presented no hindrance to more extensive educational ambitions. — Diagram 1.

DIAGRAM 1 —

ATTENDANCE AT THE PORTO INDUSTRIAL SCHOOL (1852-1853)

| Curriculum                                                        | Nº of pupils |
|-------------------------------------------------------------------|--------------|
| French — diurnal                                                  | 26           |
| French — nocturnal                                                | 53           |
| English — diurnal                                                 | 13           |
| English — nocturnal                                               | 18           |
| Arithmetic, algebra and geometry applied to the arts and industry | 20           |
| Descriptive geometry and linear design                            | 30           |
| Ornamental design and modelling                                   |              |
| — diurnal                                                         | 19           |
| — nocturnal                                                       | 60           |
| General chemistry                                                 | 11           |
| Lessons in speed reading                                          | 117          |
| TOTAL ENROLMENTS                                                  | 367          |

Although the training had a different approach, these numbers show that the Porto Industrial School rapidly became the best attended educational establishment in the city. This adherence alerted the public entities. It was time to transfer the private initiatives to Government control; it was time to overcome a certain educational eclecticism (where an overly generic or theoretic training gave way to a more professional and technical preparation); it was time to catch up with European economic development and for this the training of the creators of the new system — industrial capitalism — was instigated.

In the first structural charter for industrial teaching (30/Dec/1852), a “generic education for all the arts and crafts” was created and education was divided into “elementary, secondary and further”; it was assumed that it would only be “taught in Lisbon and Porto”; clarification of the content of the curricula to be sanctioned: “(...) elementary education comprising the 1<sup>st</sup>. subject — elementary arithmetic — basic knowledge of algebra, elementary geometry; the 2<sup>nd</sup>. subject — linear design and industrial decoration. Elementary education was considered preparation for industrial training, and could be substituted by means of an examination, with complete ratification, in the presence of teachers of industrial training. Secondary education comprises: 3<sup>rd</sup>. subject — elements of descriptive geometry applied to the arts; 4<sup>th</sup>. subject — basics of chemistry and physics; 5<sup>th</sup>. subject — design of

models and machines (1<sup>st</sup>. part). Further education comprises: 6<sup>th</sup>. subject — industrial mechanics; 7<sup>th</sup>. subject — chemistry as applied to the arts; 8<sup>th</sup>. subject — industrial economics and legislation; 9<sup>th</sup>. subject — design of models and machines (2<sup>nd</sup>. part)”.

Parallel with the above, there would be placements in “foundries for casting and moulding, metal work and adjustment, turning and modelling and laboratory operations”. It would also be desirable if “some factories in Porto” could “make workshops available for industrial training, the owners being recompensed”.

The courses resulting from the different combinations of subjects were for the “qualified worker; skilled mechanic; skilled in chemistry; blacksmith; fitter; turner and modeler; master mechanic; master chemist: and general course”. The courses for mechanical engineering technician and chemical technician could not be taken at the Porto School as they required the further education course which was only available in the 7<sup>th</sup>. phase. This detail makes plain, on the one hand, the character of the “workshop” in small industry in the northern region and, on the other hand, the reluctance to invest when faced with the financial preoccupations of investment in education. It was hoped that the anticipated stratagem — “Three years after establishing the Instituto Industrial de Lisboa (Industrial Institute of Lisbon) and the Escola Industrial do Porto (Industrial School of Porto), no worker will be admitted to State factories without the respective level of training” — would be sufficient incentive to validate the appeal of this type of education, thereby justifying expansion and a greater investment by the State.

In Porto, the scholastic population responded to this educational challenge and about 130 pupils effected 224 enrolments for various subjects. Due to the difficulties in organization, lack of qualified teachers and installations, only one training course was available (preliminary training which served as a basic qualification for the following year) which functioned between May and July, 1854 in rooms conceded by the Associação Industrial Portuguesa (Porto Industrial Association).

The numbers available for analysing the attendance at the Escola Industrial do Porto (which kept

this name until 1864 when it became the *Instituto Industrial do Porto* until 1887, calling itself I.I. and *Comercial do Porto* between 1887 and 1919, then back to I.I.P. between 1919 and 1924, I.I.C.P. between 1924 and 1933 and I.I.P. from this date until 1974) show that it was not simply an enthusiastic beginning but a very significant adherence up to 1910. These numbers also help to attest to the social, economic and, of course, cultural significance of this institution from the middle of the century until 1910.

Special attention must be given to the more than 18,000 pupils who passed through the School, Institute from 1864, of Porto until the 1st. Republic.

One can refer to the visible margin in the 80's in the competition to create the first industrial and industrial design schools from 1884-1885. That school year shows the tendency for the demand of the Institutes, which began to have different functions — either at the level of complementary training for the schools' pupils, or training centres for teachers, so necessary for the new curricula introduced in the schools.

Ever since the beginning, the life of Escola Industrial do Porto has been linked to José de Parada e Silva Leitão, with a bachelor degree in Mathematics and lecturer of Physics and Industrial Mechanics at the Academia Politécnica and appointed lecturer of the 4th. subject — “Basics of chemistry and physics”. In May, 1853, Sebastião Betâmio de Almeida (founder of the Chemistry Laboratory of the Associação Industrial Portuguesa school) was appointed for the subject of “Chemistry as applied to the arts”. The initial appointments were completed at the end of that year with João Vieira Pinto, with a bachelor degree in Mathematics and Medicine at Coimbra University, as lecturer for the 1st. subject; António José de Sousa e Azevedo as lecturer for the 2nd. Subject; Gustavo Adolfo Gonçalves e Sousa, qualified with the course in Civil Engineering of bridges and pavements at Academia Politécnica do Porto, as lecturer for the 3<sup>rd</sup>. and 5<sup>th</sup>. subjects.

This beginning was immediately marred by certain aspects which remained throughout its life until the Republic was installed:

- some interference or excessive interconnection between the Academia Politécnica and the School/Institute;

- the lack of adequate installations which caused frequent conflicts between the various occupants of the “Paço dos Estudos no Porto” (future installations of the Academia Politécnica and, nowadays, the Faculty of Sciences);

- the impossibility of fully complying with its educational duties, especially those requiring more technical space (laboratories, workshops...) thus causing a predominance of theoretical training which, with time, became confused with academic instruction and thence the merger which was requested to create a Polytechnic Institute (towards the end of 1881 and the beginning of 1882).

#### *Educational area of the industrial institute of porto*

The 50's was marked by small restructures in the curricula because of the sanctioning of the “provisional regulations” and also because of the difficulties with the installations which necessitated government authorisation for the board of the School to negotiate with the Industrial Association of Porto to cede space while adaptations were made in the Academia Politécnica.

The next decade began with the authorisation for “abandoned orphans” to attend the School. These orphans attended the College which the Town Hall had established in the same building where lessons were given. The Polytechnic Academy, the Industrial School, the Orphans' College, the Porto Lyceum, the Porto Academy of Fine Arts, the Church of Graça and commercial shops existed side by side in the same building.

In the academic year of 1864-1865, there was an alteration in legislation which would determine the life of the School — it became an Institute just as the one in Lisbon had been designated since its foundation. There are innumerable justifications duly explained in the Report accompanying the decree. The more noteworthy are:

- “Porto is an industrial city full of life and dedication and it must be openly acknowledged that its working population attends the educational courses offered at industrial schools much more assiduously than that of Lisbon”;

- “The industrial classes lack moral and intellectual instruction in accord and harmony with the

important objectives they must represent in modern society. The organization of industrial training nowadays occupies the attention of all the governments”;

– “The two industrial training establishments, which were founded here in 1852, have borne various vicissitudes and striven against numerous difficulties. (...) It is therefore necessary for new endeavours so that the first impetus takes the advantage compatible with the particular circumstances of the country”.

Within this context of industrial training, “all the arts, trades and industrial profession become general and widespread” and “special for different arts and trades”. Both concepts embody a theoretical and a practical part, the former being taught in the “industrial training establishments of Lisbon and Porto, which will be designated Industrial Institutes”. “Practical training should be given in State workshops and establishments, or in private factories and workshops”, aiming to combine theory and practice in such a way as to constitute the following courses: managers of factories and industrial workshops, executives and foremen; public works operators; mine overseers; machine operators; engine room operators; telegraphers; works foremen; lighthouse keepers; master chemists and dyers; precision instrument assemblers (this only in Lisbon)”. The 1st level of training — which constituted an elementary course — included arithmetic, basic geometry and linear drawing; principles of chemistry and physics and notions of mechanics; basic technology and geometric drawing. The 2<sup>nd</sup> level, the responsibility of the Institutes, envisaged: arithmetic, algebra, geometry, trigonometry and linear drawing; descriptive geometry applied to industry, topography and surveying and design of models and machines; physics and its applications to the arts, dyeing and printing; industrial mechanics and its application to the construction of machines, especially steam engines, and mechanics applied to the constructions; civil constructions and general technology; mining skills, assaying and metallurgy; architectural and ornate design; accounting, basics of industrial economy, notions of commercial law, administration and statistics; French and English languages.

In this reform, the functions of the following are controlled: School Boards (composed of director and teachers), Administration (comprising the Director and 2 teachers) and Further Training (embodying the Director, Members of the School Council and individuals nominated by the Government), this last having the responsibility of “proposing whatever necessary conducive to the betterment of industrial training”.

Another aspect which is useful to direct attention to has to do with the creation of “auxiliary establishments” — library, chemistry and physics laboratories, technology museum ( comprising “models, designs, instruments, different products and materials and all the characteristic objects to illustrate industrial training”) and a workshop of precision instruments (this only in the Lisbon Institute). It would be accomplished slowly, depending a great deal on financial availability and/or availability of premises, but it would show the measure of on-going training for teachers and the possibility of giving the training an effectively practical stamp and in accord with the economic needs of the region.

Towards the end of the 60’s (30th. December, 1869) and at the beginning of the 70’s, the Institutes underwent slight modifications related mainly to the inclusion of commercial training in that of Lisbon (in Porto, the commercial course continued to be administered at the Polytechnic Academy until 1886), with the exclusion of the course for mining overseers and skilled miners in Lisbon, which only figured in the curriculum of the Industrial Institute of Porto and, at the request of “teachers of chemistry applied to the arts and industry” and “industrial mechanics and its application in the construction of machines, especially steam engines, mechanics applied to buildings” respectively the 4<sup>th</sup>. and 5<sup>th</sup>. levels, to accomplish “industrial missions for the country during the two months’ holiday, making public discourses regarding the subjects of their levels in the industrial centres”.

In the 70’s, at a time when many political proposals began to show a certain malfunction causing the appearance of different alternatives — progressive, socialist and republican — the Institutes continued to be the only bastion of continual training, adapting the curricula according to the needs



of enterprises and trying to bring to the industrial economic area the new technologies and power resources of industrial capitalism nearing the 2nd. Revolution.

The 80's would be very rich, not only in furnishing the most up-to-date data to help understand the Porto area — Industrial Inquiry of 1881 — but also the definitive confirmation of the Institute within the industrial training framework. It is within the context of growing demand and appreciation of industrial training on the part of certain entrepreneurial sectors that we have to understand the educatory affirmation of the Institute within the framework of industrial training and thence the comprehensibility of some controversy regarding this educatory/training area. Added to this was the permanent scarcity of installations, having to share a building, namely the polytechnic Academy, undergoing reconstruction for almost half a century. Under these circumstances, it is understandable why the proposal was put forward in 1881 to form a Polytechnic Institute, merging the Academy with the Industrial Institute.

The report accompanying the proposal for a merger was clear on the objectives: “The creation of the Polytechnic Institute will transform two imperfect organisations into a single relatively superior one. In the Project which the Council has the honour to present, the entire range of practical training has been found compatible with the current means; the merger of the two schools has made more comprehensive offices and laboratories available and also a relatively considerable number of technical subjects. As far as possible, the life of the Institute becomes adapted to the surrounding environment. On the other hand, by giving free-rein for courses and empowering the Board to contract foreign teachers, the revelation of aptitudes which could remain ignored is facilitated and higher education in a country distanced from the great centres of thought and progress is encouraged” (Basto, 1987). The proposal was presented to the Institute “asking them to analyse it and give the Academy their opinion on the result of this examination”. The reply made the reform proposed impracticable: Dear Sirs, In reply to your request, (...) the School Board of the Industrial Institute thanks the Board of the Polytechnic Academy for their invitation to pass an

opinion on the project, (...) but feel the fundamental idea of the project must be rejected, reserving the authority to present the motive in the presence of higher jurisdiction. May God guard your Industrial Institute of Porto, 14<sup>th</sup> January, 1882. Gustavo Adolfo Gonçalves e Sousa, Director.”

Having eliminated converging paths, the identities of the Institute and the Academy were kept, obliging these institutions to incorporate curricula alterations which would reiterate their usefulness within the framework of the training of industrial and commercial technicians and, on the other hand, ensure an educational area faced with the novelty of industrial training, industrial design and even commercial education which the schools could guarantee starting with the academic year of 1884-1885.

The Institute would begin to incorporate commercial education with the reform of 30<sup>th</sup>. December, 1886 and, from January 1887, the offer is completed with the regulations for a “course in Postal and Telegraph Services” in the two Institutes, being the responsibility of the Directorate-General of Postal, Telegraph and Lighthouse Services of the Ministry for Public Works, Commerce and Industry.

The 90's was marred by alterations and announcements in the political field, in private enterprise, by financial preoccupations and, logically, in education especially in the industrial and commercial areas.

Political events were marked by the presentation of the “English Ultimatum” (1890) within the context of our growing desire to campaign again in Africa, by the first attempt to establish the Republic with the rebellion of 31<sup>st</sup>. January, 1891 in Porto and, above all, by the increasing adherence to the Republican project made obvious by the frequency in which their representatives were elected.

A controversial intervention was reserved for the educatory sphere, especially that of an industrial and commercial character, clearly marked by the need to economise at whatever cost and which, because of this, would also provoke damaging reactions from the main targets, but, speaking objectively, a clarification of the roles attributed by political power to the education administered in the Institutes. We refer to “Organização do Ensino Industrial e Comercial” (Organization of Industrial

and Commercial Training) of 8th. October, 1891, signed by the Minister João Franco.

Amongst the many opinions arising from this reform, it is worth noting that of the teachers at the Industrial and Commercial Institute of Porto who, early in 1892, at a School Board meeting, rejected it, approving an alternative reform project for their establishment which, as to be expected, was not sanctioned. What was basically in question was that the “institutes of Lisbon and Porto were being reduced to mere secondary education establishments, withdrawing elementary and preparatory education and depriving them of the dream of higher education”.

But what actually were the alterations considered so revolutionary by the school Boards of the Institutes?

- Clarification of the average character of education administered and the objectives — training for industry of experts or leaders as well as draughtsmen and industrial technicians; within the commercial field the training of businessmen “for small or large dealings as well as book-keepers and skilled accountants”.

- The division of industrial education into two “branches”:

- § that of industrial science, incorporating a general course in “general technology” and special courses in mechanics (three: metallurgy and mining skills; civil construction and public works; construction and operation of machines), one of industrial physics and the construction of physics instruments and one of industrial chemistry and the construction of chemistry apparatus;

- § that of “industrial skills” which also incorporated a general course of “industrial design” and special course for decorative painting, decorative sculpture, metallurgy, civil construction and construction of machines.

- Lisbon and Porto did not have the same courses: all of the “industrial science” courses were in the capital while in Porto only “industrial skills” were in operation. Besides this, in this city, within the branch of “industrial science” there were also courses for general technology and special courses for construction and operation of machines and that of industrial chemistry.

- In commercial training, there would be two complete courses for “businessmen of small deal-

ings (1st.degree) and large dealings (2nd.degree)” and two partial of “bookkeeping and accountancy for bookkeepers and financial accounting for heads of accounting”.

- The preparatory courses for industrial training and elements of commerce were withdrawn from the competence of the Institutes.

Later, on 25<sup>th</sup> October, 1893, indications are supplied for the functioning methods of some subjects and, above all, annexes aimed at enlarging the practical and experimental aspects of the different courses are identified; classrooms for descriptive geometry and topography, for mechanics and construction materials, chemistry and physics laboratories, classrooms for industrial botany and zoology, for mineralogy and geology, for design, for modelling, painting and sculpture, for metallurgy and mining skills (with laboratory), for civil construction and public works, for machines, rooms with laboratory for the study of merchandise, workshops for crafts in wood and iron, a commercial office and a library.

The ramifications of this reform were to extend throughout the last decade of the 90’s. Another example of this is the creation of the Elementary Course in Commerce in a School annexed to the Commercial Association of Porto.

In 1905, before the Republic, the final significant charter in the life of the Industrial and Commercial Institute of Porto emerged. This prescribed the arrangements equal to those that had already been made in 1898 for the Institute in Lisbon. We would highlight in this charter the fact of the possibility of the Institutes, both in Lisbon and Porto, of being accepted to minister courses of a “higher nature”, thus clearly assuming the complementary character of these institutions corresponding to the network of scattered elementary “technical” schools bringing a balance throughout the Country. This new role would only be questioned in Azevedo Neves’ reform in 1918, not because of the difficulties of putting it into practice or less rigorousness in training, but because, between times, a higher education had been created both in Lisbon (Higher Technical Institute) and in Porto (School of Engineering and Technical Faculty) which was more specialized and more directed towards scientific investigation.

Besides a restructuring of the curriculum appropriate for the new objectives (which went through the duplication, omission or creation of subjects), the courses which came to be ministered could be higher — industrial and commerce — and industrial secondaries — skills in chemistry, electro-technics, machines, civil construction and public works, mining, telegraph, decorative — commercial secondaries.

The 19th century had been a time when the Institutes were subjected to the commercial and industrial needs, shouldering the responsibility of being the only educative instructors of manufacturers until 1884 and, from then, coexisting with a wider network of industrial, industrial design and commercial schools. The 20<sup>th</sup>. century would bring another need to coexist with a higher education which was no longer dependent only on Coimbra but was also established in Lisbon and Porto. New functions, new roles, old installations, wealthy patrimony — in objects, but also in graduates framework — what role could the Republic and the New State cast for the Industrial and Commercial Institute of Porto?

#### THE INSTITUTES' FUNCTION IN THE CONTEXT OF TECHNICAL EDUCATION (1910-1926)

In spite of some alienation in relation to Technical Instruction, several Republican leaders made declarations on the importance of this type of instruction (Brito Camacho, in the report accompanying the Decree of 23rd. May, 1911 stating that “(...) our late development is derived from the insufficiency of our technical training, an insufficiency which, yesterday was bad, but today is a danger in the face of the struggle for the efficiency necessary to bear the competition on the world markets”) and they defended some alterations that they considered indispensable for an adequate development of the Country and as a response to the educational expectations of many students.

Following affirmations made throughout the 19th. century, a greater interaction between elementary technical schools and the local environment was defended, as was more confidence on the part of industrialists in the training furnished by the schools demonstrated by employing their pupils, the need to

transfer the services of technical instruction to the jurisdiction of the Ministry for Public Instruction (they were dependent on the Ministry for Development), a greater investment in facilities and equipment (especially the Workshops), the need to develop evening classes (although adapting the curriculum) and, above all, legislation endeavouring to adapt technical instruction to the socio-economic functions.

The aims of technical education makes it imperative to reformulate the *top* and study the pros and cons of the role the Institutes should play in juxtaposition with secondary and higher education.

Before long, on 22<sup>nd</sup>. March, 1911, Porto University was created, thus, “(...) one of the first duties of a democratic State is to assure all citizens, irrespective of wealth, the possibility of reaching the highest levels of culture (...)”. The new school was born as a consequence of the educational role played by the Polytechnic Academy since the middle of the 19<sup>th</sup>. century and would incorporate a Faculty of Sciences with an Engineering School annexed, and a Faculty of Medicine with a Pharmaceutical School. Thus ended the hierarchical proximity with the Commercial and Industrial Institute, which justified the proposals for a merger (Polytechnic Institute of Porto) although physical proximity would be maintained by the sharing of installations, which continued for some time.

In the same year, on 23<sup>rd</sup>. May, another measure would help to clarify the new role which the Republic intended to give the Institutes. The Industrial and Commercial Institute of Lisbon gave rise to the Instituto Superior Técnico (Higher Technical Institute) and to the Instituto Superior de Comércio (Higher Institute of Commerce), but more than the simple separation, it is important to refer not only to its higher education “perspective” but also to the justifications brought forward for this legislative act. A period of *professional syncretism* had been overcome and the secondary technical schools, implemented in 1884, began to produce pupils with some educational ambition. Creating a lower secondary education would be a necessity, not only from the point of view of social aspirations but also, and above all, economic goals. It is within this ambit that a set of other measures should be understood — approval of the bases of the Higher Institute of Commerce of Lisbon (1913), the creation of the Es-



cola de Construções, Indústria e Comércio (School of Constructions, Industry and Commerce) (1914), the creation of the Technical Faculty of Porto (1915), for example — that in a way prepare and help understand the reforms of 1918 and 1919, these already with effect on the new functions destined for the Industrial Institute of Porto.

In decree 5 029 of 1st. December, 1918, higher industrial training is entrusted to the Higher Technical Institute and, in the Institutes that came into being towards the end of the previous century, their commercial departments are separated (becoming the Superior Institute of Commerce) as also the Industrial sector (this falling into the category of intermediate training) and the possibility of ministering higher courses, which had been conferred by the legislation of 3rd. November, 1905, disappearing.

The regulation of the Industrial Institute of Porto (decree 6 099 of 15th. September, 1919), clearly declares and adapts a set of aspects. Instruction should be “theoretic”, consisting above all of lectures given by the teachers, “practical”, in offices, laboratories or visits, study trips, field work, or other activities considered suitable, and “professional”, for this counting on the workshops annexed to the Institute (general carpentry, moulds, mechanical metal work and casting and smithy). To complement this professional aspect, obligatory “apprenticeships” were foreseen, either in State or private establishments, counting on the collaboration of the Industrial Association for this.

It was obvious that there was great concern to explain the qualification as well as the social and professional importance of the certification. The general course corresponded to the lyceum complementary course; the specialised courses permitted those who attended to be teachers in the industrial schools (within the corresponding fields), qualifying them to be “foremen” (a now obsolete designation) or assistant engineers of public works and in mines, professionals of mail and telegraph (the course of electrotechnics and machines) and workshop foremen if they attended the course to specialize in chemical industries.

One of the aspects that the various regulations always gave special importance was the space which they seemed to devote to the “annexed buildings”. On the one hand, it is the embodiment of character-

istic pedagogy and didactics. On the other hand, it signifies the privileged space they occupied in the precincts of the Institute, with the inherent investments and new resources, objects or materials. Furthermore, and this regulation has particular emphasis, because “the laboratories and workshops of the Institute, besides their educational mission, can also perform analyses, trials and Works requested by official or private entities”. If we bring together these laboratories, offices, workshops, and library and incorporate the objects of the extinct Industrial and Commercial Museum of Porto into the Institute, we can understand the wealth of patrimony available for the use of students, the entrepreneurial strata and the population in general, and that nowadays (2004) may constitute benefits in the context of both national and international technical education.

The difficulties with facilities, the dearth of financial resources, the lack of moderation in the negotiations following the reform, the interference of the governments in nominating various directors without consulting the schools boards, and even assuming political attitudes in the milieu of the instability of the first Republic, made the life of the Institute(s) particularly difficult during this period. At the same time, it is worth mentioning the indeterminate professional situation of the graduates of the Industrial Institutes. Their category, which was that of “auxiliary engineer” according to Law 1 638 of 23<sup>rd</sup>. July, 1924, changed to “technical graduate in engineering” in 1926.

In this same year (in May), the 1st. Republic had finished its term of office, having institutionalized the Faculty of Engineering of Porto (December), anxious for the end of governmental instability following the military coup of 28th. May. The New State also brought new ideas to education, especially to the teaching to which we are privileged, seeking the roots of ISEP.

#### INDUSTRIAL INSTITUTE OF PORTO — THE STRUGGLE FOR A CREDITABLE EDUCATIONAL POSITION AND REPUTABLE CERTIFICATION (1926-1974)

The organic framework of secondary technical education diminished, on the one hand, the educative area of the Institute — because the idea of a

better training with a more exigent curriculum and the content matter more consistent with that of the schools, prevailed over the existing “syncretism of technical training” — but, on the other hand, increased its responsibility — because theoretically it would take in students who were better trained and prepared to broach an intermediate specialization. Add to this new “function” the preoccupation of distancing from higher education, namely the Technical Faculty of Engineering as from December, 1926, which appears to intend to diminish the role of the Institutes and discredit their qualified personnel. At times, this intention promoted the complacency and even the agreement of the public authorities and the established professional powers (for example the Order of Engineers).

This problem of educational and training boundaries was linked to the lack of orientation in the development of the country, to the scarcity of professional areas worthy of the personnel qualifying at the Institutes (of Commerce, Agriculture or Industrial) and, above all, a constant ill-definition of the installations to be occupied by the I.I.P. culminating in the political unwillingness to seriously invest in Education.

In this far from laughable framework, the reaction of the Industrial Institute alongside the New State was a heightened regenerative capacity, an enormous willingness to respond to the demands of the work market, the preservation of quality education (often compared to universities) and, better than all the reactions, deserving the confidence of the students throughout this period, a great receptivity on the employment market. Because of this, more and more enrolled in the courses being administered.

From 29th. July, 1926, these qualified people were given the title of “Specialists in Engineering” (*Agentes Técnicos de Engenharia*), but however, with a clear social belittling of this qualification. Coexisting with events which helped to accentuate this were the many political and Professional attitudes taken (National Congress of Engineering in June, 1931). There were also economic options which did not facilitate the opening of a more qualified or ample work market — whether due to the industrial limitations (1931), to the new National Labour Statute (1933) or to the ill-defined areas and

roles reserved for the Institutes (extinction of the Higher Institute of Commerce of Porto in October, 1933).

In order to respond to this framework, it would be impossible to avoid, within the context of the alterations to be realized for secondary technical education, a new organization of commercial and industrial technical education at the intermediary level in accord with certain changes and suggestions arising from the various sectors: these within the scope of the National Economic Council created in 1931, and those at the level of Highways (creation of the Autonomous Council in 1927), Ports (in 1929) or Mines (in 1930). Curiously they are sectors and areas contemplated in the courses to be ministered in the Institutes.

In 1931 the Reform reproducing all this confusion emerged. This claimed to “clarify the purpose of the intermediate industrial and commercial institutes in such a way that there can be no doubts regarding their indisputable usefulness”. It is recognised that the “intermediate level of technical instruction” is not only widely accepted in the “labour exchange” as “the demand for this class of technicians” is immense on the part of the industries. It is assumed that “the lack of these qualified technicians the intermediate institutes have, until now, failed to produce in sufficient numbers, has led the industries to entrust to semi-illiterate operatives technical duties for which they are totally unprepared”.

Endeavour is made to reap benefits from complementing them with the technical schools ending the courses at the institutes, which could be taught there “with economy for the treasury”, as is the case of “elementary courses in civil construction, public works assistants and industrial assemblers”. We return to the outdated title of “foreman of...” (machines and electrotechnics, public Works and mines and chemical-techniques), with disputable and inadequate justifications — “the title of engineering laboratory technician at present conferred on those qualifying at the industrial institutes satisfies no-one” and because it is easy to find in the tradition of technical professions in Portugal a title which the self-same tradition has made extremely honourable for its noteworthy value ... and this title is of foreman of...”.

Intermediate industrial education is restricted to courses of “machines and electrotechnics; constructions, public Works and mines; chemical-techniques and laboratory chemistry”, creating expectations which may never be fulfilled — “the laboratories and workshops of each industrial institute, besides their pedagogic mission, will carry out analyses, trials and any work necessary for the different services, by order of the director of the institute, and may also have to perform tasks requested by official or private entities” — because of the non-existence of appropriate conditions and hope that despite everything, the students continue to believe in the value of their training.

Really, looking at the numbers of enrolments at the Industrial Institute, for example during the 30's, if a certain quantitative irregularity is found, it is also noted a growing acquisition of students which, in 1940/41 reached numbers that the 811 deteriorated and reduced installations could not maintain. This apparent contradiction between the enrolments and the smaller social significance of the title has to be explained, much more for the quality of the education given with the corresponding rate of employability of students from recent years, rather than the lyrical demonstrations of political power which, at the end of the report of the reform hoped that the diminishing significance of the titles of qualified people would not affect the “patriotic sense of education” — “(...) the people who obtained from their spiritual leaders a just and discerning mental adaptation for their more immediate and vital needs would be prosperous and happy and dominant”.

The economic events were leaving the political greyness behind and the average competent personnel began to have an instant place in the work market instead of being eliminated in a competition with the engineers. Despite the “Salazarist ruralism”, engineers began to come to terms with political decisions and infused a dynamism which drew all the competent people to the economic transformation area and, in this context, the intermediate personnel of the institutes proved that they deserved credit.

Meanwhile, it was urgent to rethink the function of technical, secondary, intermediate and higher instruction and from then, at the beginning of the 40's, commissions of reform appeared destined to

study the problem and put forward alterations. The end of the 2nd. World War and the economic and financial benefits of the productive sectors which managed to *profit from* Portuguese neutrality, guaranteed another breathing space for more adventurous options, closer to the development of other countries but resistant to the principles of autarchy, clearly defeated by recent events, and more consistent regarding the role in education and training. In the area which interests us more, the reform of secondary technical education of 1948 brought important tidings and created, through a network of more and better distributed schools, places to respond to social pressure regarding schools which were not destined to prepare future university students. It was expected that the Institutes would correspond to this new demand, adapting their training to the new economic needs, but maintaining the quality of instruction which made their qualified personnel in demand (and coveted) on the entrepreneurial employment market.

This is the orientation of the work of the Commission entrusted with technical training reform. By listening to the main educational authorities, sounding out companies and analysing the conditions created by higher education in Engineering (since 1911), it was easy to establish a set of facts which would support the proposals of the reform:

- directly stating that “the creation of the IST (Higher Institute of Technology) in 1911, degraded the IIs”.

- it is evident that “the training of an engineer costs the State more than twice that of a technician of the IIs and, as 80% of engineering work can be efficiently performed by graduates, the waste is considerable”;

- it can be verified that of the companies who responded to an enquiry launched by the Commission, “none found the IIs useless”, although they requested a better scientific preparation of the qualified personnel because “the qualified person of the IIs has to become an engineer and still be an operative”.

Based on these significant findings, the members of the Commission reaffirm the need to invest in the Institutes, to dignify their professional status (definitively abandoning the designation “foremen”) and reorganise the courses keeping in mind the best

preparation of the candidates and the adaptation of their preparation for the renovated work market.

The incorporation of the changes begins immediately on 19<sup>th</sup>. June, 1947 when, under the Law 2 025, the role of intermediate education is clarified, forecasting the changes to be implemented as from the 50's and conferring a dignified place for the graduates — “There may also be courses organized in the industrial institutes for advancement and specialization as long as the needs of national industry justifies them”.

The decrees of 4<sup>th</sup>. November, 1950 (38 031 and 38 032), therefore, are the objective of a set of changes and new directions for technical education and also anticipate a decade characterized by substantial economic alterations, now conforming with innovative Plans of Promotion. A “theoretic, practical and officinal education” must be protected, based on a “solid scientific preparation”, not forgetting the “appropriate training in operations peculiar to their future professions, which will allow them to perform efficiently”. Great confidence is placed in laboratories, workshops, libraries and professional periods of training. The courses — electrotechnics and machines, construction and mining, laboratory and industrial chemistry — “constitute legal qualifications for placements of engineering technicians or those treated as such”. This reform, signed by Pires de Lima, completes the bridge to the extensive changes in education during the last century (19<sup>th</sup>), responding to the growing technical needs, above all, in the sectors which the State would now speculate in developing, thus permitting the Institutes' students an easy intercalation in the work context and a high demand from the most diverse companies (dams, railways, hydroelectric, iron and steel industry...).

Taking advantage of this favourable climate, the Sindicato Nacional dos Engenheiros Auxiliares, Agentes Técnicos de Engenharia e Condutores (SNEATEC — National Union of Assistant Engineers, Engineering Laboratory Technicians and Foremen), a name which well illustrates the Professional confusion since the 1<sup>st</sup>. Republic, pressurises the political powers to revindicate a better social and professional certification, obtaining a despatch in July, 1960, from the Ministry of Education which considered those qualifying at the II's

to be “qualified in engineering”. In this simple exposition, a disguised acknowledgement is achieved indicating that education disseminated in the Engineering course in the Institutes is not unworthy of the epithet “higher”. Another way of looking at this level of education which can be registered here, is its repetition with the creation of the Industrial Institute of Coimbra in September, 1965 and, finally in the investment in new installations for the institutes of Porto and Lisbon.

The 60's were responsible for a notable increase in the needs of these professionals, not only in the sectors benefiting from development and an encouraging planning as from the final decade of the 50's, but also in a colonial, or rather overseas, work market, suddenly meriting another look by the political powers. It is in this phase of development, metropolitan and colonial, that the “(...) number of engineers is increasing well and their professional activities becoming more diversified: in 1972, it was estimated that there were about 11 200 personnel qualifying at universities (engineers) and 4 300 qualifying through intermediate education (laboratory technicians); 726 engineers and 639 engineering technicians were verified in the Colonies; the dominant speciality is civil engineering in the case of engineers, but in the case of engineering technicians, it is electrotechnics and machines which, from the beginning, has revealed a greater orientation towards private industrial enterprises (...)” (Brito, 2002).

These are the features indicative of a scenario where new and more radical changes, headed by Veiga Simão, enter the drama. These changes, tried out in the Colonies, are implemented in a Metropolis rapidly wending towards revolutionary political changes but, once more, where other alterations are expected, showing the democratic way of approaching education and also public recognition of a difficult but honest struggle of the Industrial Institutes.

The path which will lead to the intercalation into the Polytechnic sphere within the ambit of legislation put forward in the years 1973 to 1988 is the highest award for their capability to “train competent professionals”; their inclusion in the “higher” sphere is the attribution of a category they never abandoned, as much for the capability of their instructors as for the level of the matters taught and, above all, for the social recognition of their graduates.

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