國立成功大學博物館工程教育史系列展專刊合輯

世紀工程

工程教育與經濟建設的百年對話

A Century of Engineering Education

The Dialogue of Engineering Education and Economic Development

第一冊





謝誌

在國立成功大學博物館建置工程教育展示室,是設立臺灣工程教育史料館 (中心)的第一階段工作。為蒐集臺灣工程教育史科,2014年中開始進行先導 性計畫,邀請十餘位校內外專家學者參與計畫。感謝下列成大化工系系友,熱 心捐款贊助該計畫及後續編撰工作的經費。

陳柱華 美國南伊利諾大學工學院前院長

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又,國立成功大學黃煌煇前校長除參與蒐集水利工程教育史科外,生前也 以財團法人成大研究發展基金會董事長的身份,惠允該基金會協助處理上述捐 款的收支事項,並將贊助《臺灣工程教育史叢書》的編印費用,在此特予銘誌。

Acknowledgement

Hung-Shan Weng (Former Acting President, NCKU)

To open up an exhibition hall dedicated to representing the history of Taiwanese engineering education at the National Cheng Kung University Museum has been the first phase to the eventual establishment of a Museum/Historical Center for the History of Taiwanese Engineering Education. In order to the historical materials on this subject, a pilot project was initiated in mid-2014, which more than 10 experts and scholars of NCKU, fellow universities, and other sectors were invited to participate and contribute. I would like to especially acknowledge the following alumni of the Department of Chemical Engineering from NCKU for their generous donation to fund for this grand project and subsequent compilation works.

- Juh Wah Chen: Former Dean, School of Engineering, Southern Illinois University, USA
- Han Lin Chen: Emeritus Professor, Southern Illinois University, USA
- W. Y. Chen: President, Berlin Co., LTD. (Taiwan)
- Shen-San Sun: Chairman, Yu Feng Rubber Industrial Co., LTD (Taiwan)
- · Ray C. Chang: President, Wah Lee Industrial Corp (Taiwan)
- · Chi Hai Lin: Chairman, TOA Resin Corportaiton Limited (Taiwan)
- Hsiang-Wen Chen: Chairman, Mingtai Chemical Co., LTD (Taiwan)
- Chung Chi Chou, PhD.: President, Dr. Chou Technologies, Inc. (USA)
- Fu-Hsing Lin: Chairman of MOMO.com, Inc. (Taiwan)

Additionally, our late former President, Prof. Hwung-Hweng Hwung, has not only been a contributor in collecting the historical materials on Hydraulics Engineering Education, but as the Chairman of the NCKU Research and Development Foundation, he has coordinated management on the donated funds for this project, which will also endorse for the publishing of the Compilation Works on the History of Taiwanese Engineering Education. We cannot be more grateful for his wholehearted support.

蘇慧貞校長序

翁鴻山前代理校長為彰顯工程教育在臺灣工程建設與工業發展的功能, 在 2014 年即發想編纂臺灣工程教育史叢書,並在本校設置臺灣工程教育史 料館。他建議先在博物館設置展示室,並將他的構想與我分享。2015 年 2 月,我就任校長後,即委請博物館陳政宏館長積極推動。透過校方補助,規 劃每年選擇一項主題展出。本計畫由郭美芳副研究員擔任策展與佈展,順利 完成首期計畫,訂名為「臺灣工程教育簡史展」,並在 2016 年 11 月 11 日 校慶日開展。其後,更依序推出以電力及鐵道發展為主題的史料展,深獲肯 定。

為讓更多未及親自到成大博物館參觀的人士觀賞上列三個主題展示內 容,成大博物館特編撰此一合輯,並上載於其網頁,我樂見其成,也欣然為 序。

蒐集史料、查證、整理及展示是備極辛勞、耗費心神的投入,在此特向 本叢書諸位著述者及編輯者致上最高的敬意。更盼望相關同仁能持續進行此 一有意義的工作。

國立成功大學 校長

蘇慧員

2020年4月

Preface Huey-Jen Su (President, NCKU)

Retrospectively, Taiwan has undergone a rapid transformation, starting from Liu Ming-Chuan of Qing Dynasty ruled Taiwan, which has shaped the once remote island with proud achievements in engineering construction and industrial development throughout its 130 years of modern history. The success of industrial education and engineering education is an important factor to this growth. The NCKU has been an important educational institute for training engineers since the Japanese Colonial Period, and our alumni have made significant contributions to the post-war reconstruction and the subsequent economic construction of Taiwan. Our university has currently the most diverse engineering departments among Taiwanese universities, which cover comprehensively different fields of the engineering discipline. The large number of alumni play a pivotal role in national economic development, engineering construction, and various industries.

Since 2014, in order to present the significance of engineering education in contribution to Taiwan's engineering construction and industrial development, Former Acting President, Hung-Shan Weng, wished to compile a series of books on the history of engineering education in Taiwan, and set up a Taiwanese engineering education history archive in our university. He suggested setting up an exhibition room in the university museum as the first step, and shared with me his plans later in the same year. In February of the following year, after I became the President, I asked Prof. Jeng-Horng Chen, Director of the NCKU Museum at the time, to promote it. Director Chen responded by preparing a plan of serial exhibitions, applied for subsidies from the school, and a theme of the exhibition was chosen every year. After the plan proposed by the museum was approved by the school, Associate Curator Mei-Fang Kuo took responsibility to oversee the installation of the exhibition. Thus, the first phase of the project was successfully completed, named "Brief History of Engineering Education", the exhibition was launched on November 11, 2016, followed by two exhibitions on the themes of power generation technologies and railway development which were launched in 2018 and 2019.

In order to enable those who have missed these exhibitions to revisit the contents displayed, the NCKU Museum has compiled the exhibition texts and photographs into this compilation. This effort in maximizing publicizing knowledge is a pleasure to see and be a part of.

Collecting historical materials, provenance research, organizing evidence, and curation are extremely demanding. I admire the selfless determination made by the authors and editors to give birth to this book, and hope that my colleagues can continue to carry out this meaningful labor.

Huer Sur Jenny Su

吳秉聲館長序

作為一所大學博物館,國立成功大學博物館是由博物館本館、校園環境場 域及院所系專業博物館群構成的體系,致力於校級文化資產的典藏、研究、展 示及推廣,並協助院所系史館室或博物館的建置。自2007年正式成立以來, 歷經各任館長的推動,館內同仁們藉由典藏與研究的成果,已陸續完成多項與 本校發展歷史重要的展覽,例如:「美援時期普渡大學,成功大學合作計畫特 展(2009)」、「校史文物展:「美援時期普渡大學,成功大學合作計畫特 校史(2010)」、「校史文物展:臺灣省立工學院院史(2010)」、「成大 溯往、輝煌八十—校史文物、檔案、映象展(2011)」、「成功大學校園環 境變遷展(2012)」以及「一顆奉獻於工程教育的大種子—賴再得教授百年 冥誕紀念展(2013)」等等。

2014年,前代理校長翁鴻山名譽教授帶領了校內外十餘位教師,進行以成 大為核心的臺灣工程教育及產業史料的蒐集、整理與研究工作。經過一年半的 努力,並獲蘇校長的大力支持,在2016年11月11日校慶日開展,名為「臺灣 工程教育史展I:簡史展(2016-2019)」,屬第一期。接續,完成第二期「臺 灣工程教育史展II:勢Power!電力泉源展(2018-2020)」,以及現正展出中 的第三期「臺灣工程教育史展III:鐵定成功!(2019-2021)」。

第一期的「臺灣工程教育史展I:簡史展」,主要是以通史概述型態呈現臺 灣工程教育的發展及演變,讓教職員生及民眾了解臺灣工程教育發展及演變 過程;規劃及教育工作者可參考前人寶貴經驗;研究臺灣歷史變遷的學者可查 閲、參考、引用。冀望藉此展示提供具歷史深度與文化內涵的反思與洞察,並 收到拋磚引玉的效果。展示內容包括各時期的國內外政經背景、科技發展趨勢 及建校的因由;科、系、所及課程、 實驗、教師等變遷情況,以及日治與美 援時期的實驗儀器與設備、及相關文物。

第二期的「臺灣工程教育史展II:勢Power!電力泉源展」以臺灣的電力發展為主題是因為電力」是大多數工程和工業不可或缺的「動力」來源。臺灣的現代化象徵應該是1888年劉銘傳在臺北城點亮第一盞電燈,也讓臺灣人民首次知覺「電」的存在。據信其使用的可能是發明於1885年的「愛迪生-霍普金森發電機」(Edison Hopkinson Dynamo)。此一型號全世界目前僅存三台,其中一台就展示於本校電機工程學系系館中庭,為1933年臺灣電力株式會社(台電前身)贈予本校當年的「電機工學科」。

第三期的「臺灣工程教育史展III:鐵定成功!」一方面,主要呈現成功大 學自日治時期起成為全臺第一所培養臺灣鐵道人才的高等工科教育機構,也因 此擁有許多珍貴的歷史素材。透過對書籍清冊、課程設計、教學儀器等資料之 研究,展覽提供了高教機構鐵道人才培育之架構與歷史演進的圖像;另一方 面,從近代臺灣的產業、經濟與技術發展為視野,以教育史的角度探討臺灣鐵 道史,並試圖建構臺灣鐵道文化資產發展的基本架構。

綜言之,從第一期的通史架構,到第二期以電力發展為核心,到第三期的 鐵道運輸發展,不僅全面又重點地呈現成大工程教育發展的脈絡與特色,同時 映照出臺灣近代的經濟建設與發展,且讓我們期待後續船舶、航運等的主題的 展現,不斷書寫臺灣與成大的工程教育史。

2020.08

Preface

Ping-Sheng Wu (Director, NCKU Museum)

As a university museum, the National Cheng Kung University Museum is comprised of the main museum, the campus environment, and several specialized department-level museums. The main museum's missions include the collection, the research, the exhibition, and the promotion of the university's cultural assets, as well as assisting other departments in establishing their own museums or historical galleries. Since its official establishment in 2007, led by previous directors and the combined efforts of the museum staffs, the NCKU Museum has successively presented several exhibitions that have highlighted many milestone moments to NCKU's history, such as: "U.S. Aid Exhibition of Purdue NCKU Project (2009)", "School History and Cultural Relics Exhibition: The Foundation of NCKU: The History of Tainan Higher Technical College, Governor-General Office of Taiwan (2010)", "The History of Taiwan Provincial College of Engineering (2010)", "Glorious 80 Years of NCKU: Artifacts, Files, and Footages (2011)", "Transformation of the NCKU Campus (2012)", and "100th Anniversary Memorial Exhibition of Professor Tsai-Teh Lai (2013)".

Starting in 2014, under the leadership of former Acting President, Emeritus Professor Hung-Shan Weng, the professors of NCKU have initiated a universitycentric project to collect and organize historical materials from industries, and to conduct researches on the history of engineering education in Taiwan. The 1.5year journey came to fruition with the opening of the first exhibition to this serial exhibition: "The Brief History of Engineering Education in Taiwan (2016-2019)" on November 11, 2016, with strong support from President Huey-Jen Jenny Su. Followed by the 1st exhibition, the 2nd exhibition was "Power! Sources of Electricity (2018-2020)", and "Laying Towards Success: Taiwanese Railway and NCKU (2019 -2021)" being the 3rd.

The first exhibition: "The Brief History of Engineering Education in Taiwan" represented the development and evolution of engineering education in Taiwan through an overview to its general history. The target audiences are three-fold: for faculty, students, and the public to comprehend the development and evolution of engineering education in Taiwan; for organizers and educators to take reference from valuable experiences of their predecessors; and for scholars whose research interests are related to Taiwanese histories to review, refer, and quote. We hope that this serial exhibition may provide an opportunity to reflect and bring insight to enrich the historical depth and the cultural essence, and in

doing so, inspire more ideas to bloom. The contents of this serial exhibition include the political and economic background both domestically and internationally, as well as the development trend of science and technology, which has prompted the establishment of various schools. This serial exhibition also covers the historical changes in regards to subjects, departments, courses, experiments, and teachers, etc., complemented with preserved practicum equipment and hardware facilities which were acquired and utilized during the Japanese Colonial Period and U.S. Aid decades.

The 2nd exhibition: "Power! Sources of Electricity" represents the history of power generating technologies in Taiwan as electricity is an indispensable "source of power" for engineering and industries. The milestone to Taiwan's modernization is considered to be the first electric light lit by Qing Dynasty governor Liu Mingchuan in Taipei City in 1888, which was also the first time that the general public of Taiwan has witnessed a tangible manifestation of the concept of "electricity". It is believed that the lighting event may have used an "Edison-Hopkinson Dynamo" which was invented in 1885. In present day, only 3 of these dynamos have remained around the world, which the NCKU is home to one of them, and is on display in the atrium of the Department of Electrical Engineering. This particular dynamo was donated by Taiwan Electric Power Co., Ltd. (the predecessor of Taipower) to our school in 1933.

The 3rd exhibition: " Laying Towards Success: Taiwanese Railway and NCKU" represents the histories of Taiwanese railway from 2 major aspects. One aspect focuses on the NCKU as the first higher engineering education institution in Taiwan, which holds abundant historical materials, as the university is the alma mater to many engineers and technicians who have contributed their knowledge and knowhows to the Taiwanese railway since the Japanese Colonial Period. Through the research on books and archives, records on curricula, teaching equipment and other materials, the exhibition is able to provide a comprehensive image on the educational structure and development of technical training and education in a higher education institution. Another aspect of this exhibition represents the railway histories from the perspective of industrial, economic and technological development in modern Taiwan, which explores the history of Taiwan's railways from the perspective of educational history, and attempts to frame a fundamental structure to further develop the railway cultural assets in Taiwan for the future.

In summary, not only have the first 3 exhibitions of this serial exhibition on the history of engineering education been comprehensively and emphatically presented the historical context and characteristics of engineering education in NCKU, but also have made historical reflection towards Taiwan's modern economic infrastructure and development. We are currently in great anticipation towards the upcoming exhibition on the theme of ships and logistics, with this we create a sustainable relevance to the history of engineering education of Taiwan and our university.

Ping-shenghhu



翁鴻山教授序

建置臺灣工程教育史料館的發想

筆者在擔任臺灣化工史叢書(含臺灣化工教育史)總編輯暨臺灣化工教育史 主編後,對臺灣工程教育發展歷程有概略的瞭解。筆者認為本校具有最佳條件 也最適合設置臺灣工程教育史料館(中心),該史料舘將成為本校一個特色。初 期先設置展示室,未來若有場地與經費,擬建置永久性的館舍。所以在2013 年該叢書9篇全部出版後,就發想以本校為中心,蒐集史料、整理、研究臺灣 工程教育及相關的工程建設和產業發展史,並以在本校建置臺灣工程教育史料 館為遠程目標。此一構想幸獲馬哲儒、黃定加、翁政義和黃煌煇四位前校長 的鼓勵和工學院吳文騰前院長的贊同,其後有九位化工系系友(陳柱華、黃漢 琳、陳文源、孫春山、張瑞欽、林知海、陳尚文、周重吉、林福星)惠允贊助 經費,這十四位也同意擔任發起人。

收集工程教育史科

筆者於2014年中,開始邀請校外鄭麗玲、廖振旺、曾勘仁、何清釧、周宜 雄等專家學者,及本校高淑媛、褚晴暉、陳建富、蔡文達、李德河、徐明福、 黃煌煇、張祖恩、陳政宏、湯堯等教授,參與收集不同時期及不同工程領域的 史科,每一計畫為期半年至一年。

在成大博物館初設展示室

2014年底,筆者將上述的情況告訴甫當選校長的蘇慧貞副校長,她也贊同 在博物館內設置展示室。隔年2月,蘇校長上任後即請博物館陳政宏館長開始 推動。陳館長立即召集規畫會議,研擬計畫書,請郭美芳博士擔綱展示室規劃 工作;由筆者撰寫臺灣工程教育發展歷程概要,郭博士製作看版及大年表。同 時也請物理,化工、機械和電機等系提供史料及早期實驗設備。歷經多次討 論和修正,終於順利完成首期計畫,訂名為「工程教育展 |:簡史展」,在 2016年11月11日校慶日開展。

配合展示相關工程建設及產業發展

原規劃先展出臺灣工程教育發展歷程,其後逐年展出各學門的發展情形及 相關教學、實習、研究、畢業生就業等情況。但是在2016年11月開展後,筆 者與陳館長認為後續各學門的展示,宜配合展示相關工程建設及產業發展,或 以各類工程建設及產業為主,展出它的發展歷程及相關工程教育的發展情況。 這個想法獲得規劃小組同仁贊同,咸認一則可讓博物館觀眾了解臺灣工程建設 及產業發展情形,另則可顯現成大畢業生在工程界及產業界扮演的角色,凸顯 本校的重要性與特色。

第二、三期展示主題

隨後即請同仁建議第二期的展示主題。因為電力是社會與產業發展的泉 源,就決定以臺灣電力發展為主題,定名為「勢Power!電力泉源展」。也由 陳政宏館長研擬計畫書,請郭美芳博士擔綱展示室規劃工作,由筆者和郭博士 一起收集資料、參觀,撰寫臺灣電力發展簡史;復由臺電公眾服務處袁梅玲處 長的協助與安排下,由郭博士與方宥蓁助理陪同拜訪校友進行口述歷史。並請 物理,化工、機械和電機等系提供史料及早期實驗設備;請機械系顏鴻森教授 和陳政宏館長指導裝設水力發電原理及互動模型裝置;也請成大科學教育中心 許瑞榮教授設計電磁及發電實驗供參觀者。

第三期展示主題,則是配合陳政宏館長申請「文化部推動臺北機廠轉型鐵 道博物館補助計畫」,而決定以臺灣鐵道發展為主題,定名為「鐵定成功!鐵 道展」。鐵道建設攸關國防、工程建設、產業及社會的發展,所以優先排入。 同樣地,也在陳政宏館長主持下,請郭美芳博士擔綱展示室規劃工作,並請交 管系陳勁甫主任、土木系郭振銘主任、機械系楊天祥主任及陳重德教授等人協 助提供課程、聯繫校友安排訪談、研究並論述展示內容。

本書是上述三個主題展示專刊的合輯,為讓更多的人士觀賞展示內容,成 大博物館特編輯此一合輯,並上載於其網頁。由於相關工程建設之史料極為浩 瀚,規劃小組僅擇要點展示,展示方式是否允當,是否有疏漏或謬誤之處,敬 祈諸先進不吝賜教訂正。

在上述收集與整理資料、規劃展示及聯絡等工作,幸賴江映青、方宥蓁與 李柏霖等前後三位助理,及蔡侑樺博士鼎力協助,借此一隅表示由衷謝意。

> 國立成功大學化工系名譽教授 翁鴻山 謹識 2020.5

Preface

Hung-Shan Weng (Emeritus Professor, Department of Chemical Engineering, National Cheng Kung University)

The Vision of Establishing a Museum for Engineering Education in Taiwan

Through serving as the editor-in-chief of the "Chemical Engineering History of Taiwan" series (which also covers the history of chemical engineering education in Taiwan), as well as the senior editor of "The History of Chemical Engineering Education in Taiwan", I have acquired a general understanding of the development of engineering education in Taiwan. With this knowledge, I believe that the NCKU has the best conditions to be suitable to establish a museum dedicated to its related histories. This museum-in-planning will become a feature of the university, although our short-term goal is to set up exhibition galleries within existing buildings, and a permanent museum building will be built if we shall secure enough funding and a proper space in the future.

As mentioned, after the total of 9 books of the "Chemical Engineering History of Taiwan" series have been published in 2013, I've intended to orient the NCKU as the main institution to collect and organize historical materials to focus study on the history of engineering education and related engineering construction, as well as the industrial development in Taiwan. These researches are conducted with the long-term prospect of which the Museum/Center of Taiwanese Engineering Education History may be established at our university. This vision of mine was fortunately encouraged by 4 of our former presidents: Jer-Ru Maa, Ting-Chia Huang, Cheng-I Weng, and Hwung-Hweng Hwung; also, the endorsement from the former Dean of the Engineering College, Wen-Teng Wu. Furthermore, there are 9 alumni from the Department of Chemical Engineering have acted as patrons and sponsors to this project: (Zhu Wah Chen, Han Lin Chen, W. Y. Chen, Shen-San Sun, Ray C. Chang, Chi Hai Lin, Hsiang-Wen Chen, Chung Chi Chou, Fu-Hsing Lin).

Collecting Historical Material

Since mid-2014, I have begun to invite experts and scholars Liling Cheng, Jenn-Wang Liao, Kan-Ren Tseng, Ching-Chuan Ho, and Yi-Shyong Chou, as well as NCKU professors Shu-Yuan Kao, Ching-Hwei Chue, Jiann-Fuh Chen, Wen-Ta Tsai, Der Her Lee, Min-Fu Hsu, Hwung-Hweng Hwung, Juu En Chang, Jeng-Horng Chen, and Yao Tang to participate in collecting historical materials in different periods and different engineering fields. Each project lasts from 6 months to a year.

First Exhibition held in NCKU Museum

At the end of 2014, I have shared with then vice-President Huey-Jen Jenny Su, who has just been elected to become our new President at the time, about the aforementioned project and my visions; she has also approved the idea of setting up an exhibition hall in the University Museum. In February of the following year, President Su immediately asked the director of the museum, Jeng-Horng Chen, to begin organizing the exhibition. A meeting was initiated to develop a project plan, which Dr. Mei-Fang Kuo was appointed to plan the exhibition room. I've become the author for a summary of the development history of engineering education in Taiwan, and Dr. Kuo created the exhibition boards and chronology. Meanwhile, we have requested the Departments of Physics, Chemical Engineering, Mechanical Engineering, and Electrical Engineering, to provide historical materials and experimental equipment of the desired periods to be displayed in the exhibition. After months of hard work and compromises to our project plans, the very first exhibition, named "The Serial Exhibition on the Engineering Education of Taiwan (I): A Brief History", was finally opened on November 11, 2016.

Reorienting Exhibition Themes to Highlight Industry Development

Originally, we have planned the serial exhibition in progressions by firstly a general introduction on the history of Engineering Education, follow up by the histories and current situations on the different fields of engineering, which we would go over topics such as teaching, internships, research, and alumni activities. However, after the launch of our first exhibition, Director Chen and I believed that we should reorient the future exhibitions of these various engineering fields to be incorporated with the histories of industrial development in Taiwan. This would allow a parallel view of the concurrency between education and industries to represent how the two have co-developed throughout history. This epiphany was validated by our colleagues in the planning team. I believe this would enable the museum visitors to get a better understanding to the engineering construction and industrial development in Taiwan, at the same time, it has the potential to highlight the impact factor of our alumni.

The Themes for Exhibitions II and III

As soon as we have decided towards this new curating direction, we have immediately invited our colleagues to brainstorm a theme for our second exhibition. We have then decided to focus on Electrical Engineering because electricity is the source of social and industrial development. The second exhibition in this series, named " Power! Source of Electricity", which the project plan was written by Director Chen, and the exhibition room was planned by Dr. Kuo. Along with Dr. Kuo, I have collected the references and visited facilities in order to write a brief history on the development of electricity in Taiwan. With the help of Mei-Ling Yuan (Head of Public Relations, Taipower), supplementary oral histories of our alumni were able to be collected by Dr. Kuo and her assistant. We have also requested the Departments of Physics, Chemical Engineering, Mechanical Engineering, and Electrical Engineering to provide historical materials and experimental equipment for display. A demonstrative installation of hydropower engineering principles was constructed under the supervision of Prof. Hong-Sen Yan (Department of Mechanical Engineering) and Prof. Jeng-Horng Chen (Department of Naval Mechatronic Engineering), and Prof. Rue Ron Hsu from the Science Education Center have contributed by designing an assorted number of electromagnetic and power generating equipment for our interactive booth.

The theme of the third exhibition was named "Railway to Success" to collaborate with Director Chen's research project (subsidized by the Ministry of Culture) which is a part of the national program in transforming the Taipei Railway Workshop into the national railway museum. We have prioritized this theme based on our recognition in which that railway infrastructures hold critical value in national defense, engineering construction, industrial and social development. Similarly, this exhibition project was led by Director Chen, with Dr. Kuo being in charge of the planning of the exhibition room. Additionally, we have invited the Directors of various departments, including Director Ching Fu Chen (Traffic Management), Director Chen-Ming Kuo (Civil Engineering), Director Tian Shiang Yang (Mechanical Engineering), and Prof. Chung De Chen to help provide courses and list of alumni for reference, conduct oral history interviews, and curating exhibit content related to their profession.

This book is a compilation of the aforementioned three exhibitions edited and published by the NCKU Museum to give the general public a thorough view to their contents. Due to the vast amount of historical data collected in researches related to these exhibitions, the curatorial team could only select several aspects and issues to be represented. I would like to ask readers for any feedbacks and discussions should there be issues and suggestions in regards to our display methods, or possible omissions or errors.

Last but not least, I would like to express sincere gratitude to Dr. Yu Hua Tsai, assistants Ying-Qing Jiang, You-Zhen Fang, and Bo-Lin Li for their effort in helping the team in data and material collection, planning, and coordinating.



陳政宏前館長序

成大博物館從籌備處時期開始,就注重臺灣的工業發展與工程教育之間的 關係。除了像「理性的刻度」這類特展展出本校工程教育中重要的人事物之 外,更開展和校史相關的臺灣工程教育史研究。最早可能是由國立科學工藝博 物館蒐研組故主任王玉豐校友,和本校機械系顏鴻森國家講座教授一起策動了 美援時期普渡大學與本校合作的研究與特展。當時(2006年)找了歷史系陳 恒安、高淑媛兩位教授和我一起蒐羅檔案、研究內涵;而後擴大為建築系徐明 福教授帶領的大型研究策展團隊。該展示除了校史的性質外,也有幾項一般教 育、校史研究展示較少出現的特色:以古今/國內外對照方式反思高等教育政 策與發展、探討學校發展與國家政策、地區發展的互相影響、強調對技術物與 政策的研究、長短期不同時間尺度觀點的交互參照、跨領域及跨單位研究團隊 的長期合作等。

這些特色從那次研究與展示起,即以博物館為工作交流平台,透過幾個核 心成員在博物館平時校史相關業務、特別研究及展示計畫的執行過程中保持下 來,並不斷地深化發展。其中最重要的一項活動就是由翁鴻山前代理校長策劃 的本計畫。本計畫試圖比傳統的校史展示更深入探討過往臺灣各校工程教育與 國家經濟建設與社會發展的相互影響,並透過系統性中長期系列特展的方式, 希望在校史面能凸顯校友深入社會各層面的影響力與貢獻,在教育面能勾勒串 連各校工程教育的特色與核心價值,在展示效果上能加強現在學生對校風校史 的認識與認同,在博物館學方面能拓展大學博物館對學術遺產回顧及應用方法 的創意,在校內組織上能實驗博物館類單位的教育與公關角色。

迄今的幾檔特展先從通史開始,進而搭配時事與相關資源,以產業主題方 式串接不同工程領域,分期展示;首批都以基礎建設為主,由深具臺灣現代工 業化象徵意義的水力發電開始,再到分別扮演島內、島外交通大動脈的鐵路、 航運為主題。未來規劃朝向其他重要產業主題研究、展示。

最後感謝十多年來持續在行政與研究上大力支持與指導的蘇校長、翁前代 理校長、所有曾經支持研究與展示的校友、曾經參與研究及展示的老師們、助 理們。眾志成城,功不唐捐。

陳政宏 謹識 2020.7

Preface

Jeng-Horng Chen (Former Director, NCKU Museum)

The NCKU Museum has been emphasizing on the relationship between Taiwan's industrial development and engineering education since its preparatory office period. In addition to past exhibitions such as "The Marks of Rationality" which highlighted important people and events throughout the history of NCKU, the later research projects on the - history of Taiwan's engineering education related to the history of NCKU. The first comprehensive research project and exhibition may have been the one planned by late Director Yuh-Fong WANG (Collection and Research Dept., NSTM) and National Chair Professor Hong-Sen YAN (Dept. of Mechanical Engineering, NCKU) in 2006 on the history of NCKU during U.S. Aid Period. Professors Heng-An CHEN and Shu-yuan KAO from Department of History, as well as myself, were invited into the project to collect and interpret archival materials; then, the project was expanded with a larger research and curatorial team led by Professor Min-fu HSU (Dept. of Architecture). The exhibition covered not only the perspective from the history of the university itself, but also several viewpoints that are lesser seen in general history studies and exhibition of education or schools: (1) The reflection on higher education policy and development in comparison between time and space (domestic vs foreign), (2) The discussion on the correlation between school development, national policies, and regional development. (3) The emphasis on the research of technological objects and policies, (4) The cross-referencing of long-term and short-term perspectives on different time scales, and (5) The longterm cooperation between cross-disciplinary and cross-department research teams.

These 5 characteristics have been maintained since the very first research and exhibition, with the NCKU museum being a platform of exchange through collection, research, and exhibition projects led by core members, which have continued to enrich their value. One of the most important projects is this particular project planned by Hung-Shan WENG (former Acting President and Emeritus Professor, Dept. of Chemical Engineering, NCKU). This project attempts to explore the co-evolving relationship between the histories of Taiwanese engineering education through engineering schools and Taiwan's economic and social development through a more in-depth exploration compared to traditional school history exhibitions. Through a systematically planned serial exhibition, our goal is to (1) highlight the alumni contribution in reflecting to the school's history, (2) outlining the characteristics and ethos of major engineering schools in Taiwan in reflecting to the school's history, (3) to inspire the students' understanding and appreciation to the school's history through exhibitions, (4) to expand the creativity as a university museum when reviewing academic heritage and application methods, and (5) open the opportunity

to experiment with the educational and public relations roles of museum-like departments of the university.

The first few exhibitions of this serial exhibition began with the general history of engineering education in Taiwan, which then combines current events and related resources to connect different engineering fields based on different industries. The first phase of exhibitions is mainly related to national infrastructure, starting from the hydraulic power generation, which is significant to Taiwan's modern industrialization, then to the major logistics and transportation technologies such as railway and shipping.

Last but not least, I would like to thank President SU and Professor WENG, who have greatly supported and guided us through our researches and administrative efforts. My gratitude is also to all of our supportive alumni, and to the professors and assistants who have participated in researches and exhibitions.

Solidarity and efforts will never be in vain.



緒言

工業教育 / 工程教育為國家培育人才

自1912年臺灣總督府設置工業講習所起至二戰結束,臺灣境內的工業職業 學校及工業類的大專院校,包括臺北工業學校、臺南高等工業學校、七所州立 工業學校及工業專修學校,培育了無數工業與工程人才,對臺灣工業發展與工 程建設作出極大的貢獻。雖然台籍畢業生不多,但是在戰後復建及傳承及隨後 所謂「臺灣經濟奇蹟」扮演了主要的角色。

戰後,政府在各縣市廣設職業學校;臺南高等工業學校在二戰前後,歷經 二次改制,於1946年升格為臺灣省立工學院。韓戰爆發後,美國開始協防臺 灣並給予經濟援助,也對農工教育提供建議,其中在高級工業職業學校施行單 位行業訓練制與行業單位教學法,對改進工業教育有甚大的助益。此外1948 年政府也將臺北工業學校升格為省立臺北工業專科學校。

1953年開始施行六期四年經建計畫;1950年代後期,臺灣經濟開始顯著發展,政府以增班因應。1973年十大建設開始推動,需要工程人才殷切,因此政府除新設高雄工業專科學校外,核准設立18所私立工業專科學校。1974年更新設國立臺灣工業技術學院。其後又有十二項建設計畫及十四項重要建設計畫,政府遂於1991年增設國立雲林技術學院,將國立臺北工業專科學校升格為國立臺北技術學院,並增設國立高雄技術學院。後來因開放私人興辦技術學院,技術學院數量急遽增加。不久又放寬改制科技大學,因此科技大學校數大幅增加。

而在工業發展方面,繼戰後重建期(1945-1952),其後臺灣的發展歷經進 口替代(1953-1964)、出口擴張(1965-1975)、資本密集與策略性工業(1976-1990),以及高科技工業(1991-現在)等時期,工業不僅快速發展,而且技術層 次提高,幸賴政府預先培育人才,得以充分供應。

1980年代中期以後,臺灣轉向技術與知識密集的產業發展;2000年又開始 發展六大新興產業,緣色矽島及兩兆雙星產業,大學相關理工科系時提供了高 至博士級的大量人才因應。 工業類和工學類各級學校培育的人才,除了供應工程建設和產業界的需求 外;身為主管者,則帶領工程建設、產業和科技的發展;少數投身教育界者, 則擔負培育後起之秀,甚至左右教育的政策與走向。

本校的重要性與角色

前述日治時期培育工業人才的學校,主要是八所州立工業學校及臺南高等 工業學校(即本校前身)。臺北帝國大學(臺灣大學前身)因為是在1943年才增設 工學部,二戰結束後那一年才有2位台籍畢業生。

戰後初期,大專層級的工業與工程人才,主要是依賴省立臺北工業專科學校(北科大前身)、省立工學院(成大前身)及臺灣大學三校培育。其中,省立工學院及其前身的畢業生,對戰後復建及隨後的經建發展作出重大的貢獻。其後的畢業生也一直廣獲企業界的青睞,在公民營單位及企業扮演重要的角色。

本校自日治時期開始,即為培養工程師的重要學校,在臺灣的影響力十分 深遠;目前工程領域的系所數量全臺最多、分布最完整,校友數量極為龐大, 在各產業及公私部門都是舉足輕重,對國家經濟發展與工程建設有重要貢獻。

本校最適合建置臺灣工程教育史料館

綜合前述,本校具有最佳條件也最適合設置臺灣工程教育史料館,該史料 舘將成為本校一個特色。初期先設置展示室,未來若有場地與經費,擬建置永 久性的館舍。另一方面,本校機械、電機和化工等系皆設有系史館,而且成大 博物館一直持續收集、整理日治時期及戰後初期的資料,也曾出版書刊及展示 文物,它們可視為史料館的協同單位。

因為設置工程教育展示室或史料舘,皆需搜集史料,既然有了史料,就可 進一步編撰工程教育史。所以就把設置工程教育發展展示室,列為第一階段的 工作,編撰工程教育史列為後續的工作,建置工程教育史料館定為遠程的目 標。

設置展示室的目的及效果

設置展示室的目的在於(1)蒐集、整理、分析、研究臺灣工程教育的相關歷 史資料;(2)展示、呈現及推廣臺灣工程教育的演變、特性、經驗;(3)為設置 臺灣工程教育資(史)料料館(中心)準備。完成後,不僅相關師生員工及一般民 眾可以了解臺灣工程教育的發展演變過程,工程教育者也可參考前人經驗作為 借鏡,研究臺灣歷史或工程教育的學者也可查閱、參考、引用。

藉由展示及其他推廣活動發揚其精神,不僅有助於了解及補全對於臺灣產 業發展及高等教育歷程的認識與分析,並對未來本校、臺灣高等教育,甚至產 業的發展,提供具有歷史深度與文化內涵的反思與洞察。

在成大博物館設展示室

在2014年底,翁鴻山教授將設置工程教育展示室的因由與構想告訴甫當選 校長的蘇慧貞副校長,她也同意在博物館內設置展示室。隔年2月,蘇校長上 任即請博物館陳政宏館長推動,預定在2016年11月11日85週年校慶開展。

陳政宏館長立即召集規畫會議,自己研擬計畫書,請郭美芳博士擔綱展 示室規劃工作,由翁教授撰寫臺灣工程教育發展歷程概要。同時也請物理、 化工、機械和電機等系提供史料及早期實驗設備。歷經多次討論和修正,在 2016年11月11日校慶日開展。

配合展示相關工程建設及產業發展

原規劃先展出臺灣工程教育發展歷程,其後逐年展出各學門的發展情形及 相關教學、實習、研究、畢業生就業等情況。但是在2016年11月開展後,規 劃小組同仁認為後續各學門的展示,宜配合展示相關工程建設及產業發展;或 以某些類工程建設及產業為主,展出它的發展歷程及相關工程教育的發展情 況。這個建議非常適當,一則可讓博物館觀眾了解臺灣工程建設及產業發展情 形,另則可顯現成大畢業生在工程界及產業界扮演的角色,凸顯本校的重要性 與特色。

工程建設、產業與科技發展對教育的影響

國家工程建設、產業和世界科技的發展,不僅影響政府的教育政策,從而 左右各級學校的興建及科系所的發展,也影響各科系所課程的規劃。臺灣歷經 戰後復建、美援、經建發展等時期,教育急速發展,當然各科系所的課程也有 大幅度的兑變。

第二、三期展示主題

隨後,即請同仁建議展示主題。因為電力是社會與產業發展的泉源,就決 定以臺灣電力發展為第二期主題,定名為「勢!電力泉源展」。也由陳政宏館 長研擬計畫書,請郭美芳博士擔綱展示室規劃工作,由翁教授和郭博士一起收 集資料,撰寫臺灣電力發展簡史。並請物理,化工、機械和電機等系提供史料 及早期實驗設備。

第三期配合陳政宏館長申請文化部推動臺北機廠轉型鐵道博物館補助計 畫,而決定以臺灣鐵道發展為主題,定名為「鐵定成功!鐵道展」。鐵道建設 攸關國防、工程建設、產業及社會的發展,所以優先排入。同樣地,也在陳政 宏館長主持下,請郭美芳博士擔綱扛展示室規劃工作,並請交管系陳勁甫主 任、土木系郭振銘主任、機械系楊天祥主任及陳重德教授等人,協助提供課 程、系友名單。

預期展示效果

藉由展示及其他推廣活動發揚其精神,不僅有助於了解及補全對於臺灣產 業發展及高等教育歷程的認識與分析,也可以藉此凸顯本校的重要性與特色, 並對未來本校、臺灣高等教育,甚至產業的發展,提供具有歷史深度與文化內 涵的反思與洞察;同理,本校也可說是目前國內最適合從事此項研究的學校, 惟須與其他幾個種重要的學校搭配進行。

後續的展示

後續展示的主題將考慮下面三個因素作決定:

- 1. 重要的工程建設或產業;
- 2. 與本校工程領域的系所相關;
- 3. 政府單位(例如文化部)徵求計畫相關的主題。

為了銜接第三期鐵道展,第四期的主題已決定為「港埠與船舶」。

Introduction

Hung-Shan Weng (Former Acting President, NCKU)

The National Contribution of Industrial Education and Engineering Education

The engineering education of Taiwan began with the establishment of the Auxiliary Industrial Institute by the Governor-General of Taiwan in 1912, until the end of World War II, the Japanese have established several institutes to provide engineering education, including Taipei Industrial School, Tainan Higher Technical College, as well as seven state-level industrial schools. The graduates from these schools and colleges have contributed greatly to Taiwan's industrial development. Although the majority of graduates have been Japanese, the very few Taiwanese graduates have taken major roles during the reconstruction period after WWII which paved ways into the "Taiwan Economic Miracle" happened during the next few decades.

After the war, the KMT government began to establish vocational schools all around the island, during which the Tainan Higher Technical College has undergone reformation twice to be uplifted into Taiwan Provincial College of Engineering in 1946. After the Korean War, the United States have set up programs to help Taiwan in national defense to provide financial assistance, and to help improve agricultural and engineering education. The practice of internship and unit teaching methods implemented in advance-level engineering schools have become a major positive influence in refining engineering education. In addition, the Taipei Industrial School was upgraded to the Provincial Taipei Institute of Technology (a junior college of technology) in 1948.

In 1953, the first phase of a total of 6 Four-year Economic Development Plans was initiated; by late 1950s, the Development Plans have encouraged significant growth into Taiwan's economy and industries, which the government has responded by increasing the enrollment availability to engineering schools. In 1973, the government began to push the Ten Major Construction Projects, which workforces especially engineers became of high demand. In order to meet with this heightened demand, the government has not only established the Kaohsiung Institute of Technology (Junior College of Technology), but has also approved the establishment of 18 private junior colleges of technology. In 1974, the National Taiwan Institute of Technology (NTIT), a college of technology, was also established. After the Ten Major Construction Projects which focused on heavy industry development, the government has then initiated two more major construction projects which focused

on regional and social infrastructures. During this period, National Yunlin College of Technology was established in 1991, and the Provincial Taipei Institute of Technology has been upgraded to college status, and was renamed as the National Taipei Institute of Technology, and added the National Institute of Technology of Kaohsiung (a technical college). During this decade, the number of private technical colleges increased exponentially due to the new policy of the Ministry of Education which promoted vocational education. Many of these technical colleges were then uplifted into universities of science and technology during the late 1990's.

From the perspective of industry development, Taiwan has gone through several stages following the Post-WWII reconstruction period (1945-1952), including the import substitution period (1953-1964), export expansion period (1965-1975), the rise of capital intensive industry (1976-1990), and the introduction and flourishing of high-tech industry (1991-present). Generally speaking, the industries of Taiwan have not only developed rapidly but also advancing through technological levels, which could not have happened without the government's initiatives of training and building up substantial amount of engineering workforces.

After the mid-1980's, Taiwan has shifted gears towards developing industries that are intensive in technology and patenting. At the turn of the 21st century, Taiwan began to push forward several industrial development programs and supportive policies, including "Six Emerging Industries Development Program", "Green Silicon Island Development Program", and "Two Trillion and Twin Star Development Program". In the meantime, these developing industries have been fueled by a substantial flow of technological and engineering graduates from higher educational institutes and universities.

The workforces trained and educated by industrial and engineering schools have not only been the workforces of engineering and industry, but also as the leadership roles of their fields, such as supervisors who would lead infrastructure projects, developing the industry and technology. Meanwhile, there are few who contributes back to the education system by becoming teachers and instructors, to take up responsibility of educating new generations to become engineers and can even steer the direction of education-related policies.

The Importance of NCKU and its Role

The major educational institutes dedicated in training technological and engineering workforces during the Japanese Colonial Period were the eight state industrial schools and Tainan Higher Technical College (the predecessor of NCKU). Whereas the Taipei Imperial University (the predecessor of National Taiwan University) had only two Taiwanese graduates at the end of WWII due to its relatively late establishment of the Faculty of Engineering in 1943.

During the first few decades after WWII, the college-level industrial and engineering workforces have mainly come from the Provincial Taipei Institute of Technology, the Taiwan Provincial College of Engineering (TPCE, predecessor of NCKU) and National Taiwan University. Among the 3 schools, the graduates of TPCE have played an important role in both public sectors and private sectors, and made significant amount of contribution to national-level projects as well as economic development. By this lineage, the graduates of NCKU have been widely favored by corporations.

The NCKU has been one of the foremost institution for engineering education in Taiwan since the Japanese Colonial Period, which its influence has rooted deep into Taiwan's economical and industrial growth. The university holds the most comprehensive and varied departments within the engineering field, and the large number of alumni have taken imperative roles to the national development through both public and private sectors.

The Most Suitable Canditate to establish a Museum of Engineering Education History

With the aforementioned matters in regards to NCKU's background and lineage, we believe that this university has the best conditions to be suitable to establish a museum dedicated to its related histories. This museum-in-planning will become a feature of the university, although our short-term goal is to set up exhibition galleries within existing buildings, and a permanent museum building will be built if we shall secure enough funding and a proper space in the future.

As collecting historical materials is a fundamental step in establishing any history museum, we are able to first study these materials to compose ample manuscripts of engineering education history. The first step of this project would be opening up exhibition halls (galleries) for exhibiting the histories of engineering education, followed by the publishing of manuscripts. Prospectively, the Museum/ Center of Taiwanese Engineering Education History shall finally be established at our university.

The Purpose and Prospect in establishing an Exhibition Hall

The 3 purposes of setting up an exhibition hall are:

- 1. to focus curating and studying on materials that are relevant to engineering education in Taiwan;
- to raise public awareness to the transitions, characteristics, and experiences of Taiwan engineering education;
- 3. to prepare for the establishment of a Museum/Center of Taiwanese Engineering Education History.

The establishment of this museum will enable not only those within the university but also the general public to gain access to the knowledge of the development and evolution of engineering education in Taiwan. The knowledge base will be suitable for educators of the engineering field for past referces, and for scholars of similar research interests.

Through exhibitions and promotional activities, we will not only help the public to gain comprehensive and analytical knowledge on the developmental history of Taiwan's industry and higher education, but can also provide a conservatory of the university's historical roots for future development.

Setting up an Exhibition Hall in NCKU Musuem

At the end of 2014, Prof. Hung-Sang Weng has shared with then vice-President Huey-Jen Jenny Su, who has just been elected to become our new President at the time, about the aforementioned project and his visions; she has also approved the idea of setting up an exhibition hall in the University Museum. In February of the following year, President Su immediately asked the director of the museum, Jeng-Horng Chen, to begin organizing the exhibition. The first exhibitions would be planned to open on November 11, 2016, during the university's anniversary.

Director Chen had promptly initiated a meeting to develop an exhibition project plan, whom himself had become the author of the plan's manuscript. Dr. Mei-Fang Kuo was appointed to plan the exhibition room, while Prof. Weng has become the author for a summary of the development history of engineering education in Taiwan. Meanwhile, we have requested the Departments of Physics, Chemical Engineering, Mechanical Engineering, and Electrical Engineering, to provide historical materials and experimental equipment of the desired periods to be displayed in the exhibition. After months of hard work and compromises to our project plans, the very first exhibition, named "The Serial Exhibition on the Engineering Education of Taiwan (I): A Brief History", was finally opened on November 11, 2016.

Reorienting Exhibition Themes

Originally, we have planned the serial exhibition in progressions by firstly a general introduction on the history of Engineering Education, follow up by the histories and current situations on the different fields of engineering, which we would go over topics such as teaching, internships, research, and alumni activities.

However, after the launch of our first exhibition, the curatorial team believed that we should reorient the future exhibitions of these various engineering fields to be incorporated with the histories of industrial development in Taiwan. This would allow a parallel view of the concurrency between education and industries to represent how the two have co-developed throughout history. The will enable the museum visitors to get a better understanding to the engineering construction and industrial development in Taiwan, at the same time, it has the potential to highlight the impact factor of our university towards the industries by presenting the quantities and qualities of our alumni.

The Influence of the Development of Infrastructure, Industries, and Technology on Education

The development of national infrastructure, industries, and global technologies are key factors which its influences would chain top-down from steering government's education policies, which affects the possibility of emergence for specialized schools of all levels, the establishment of departments within higher education institutes, unto the curriculum planning of various departments. Retrospectively, as Taiwan thrived from the post-WW2 reconstruction period, the US-Aid program, and series of Economic Development Plans, its education system has not only developed rapidly, but the curricula of every department have also undergone through multiple substantial alterations.

The Themes for the Second and Third Exhibitions

As soon as we have decided to reorient our curating direction, we have immediately invited our colleagues to brainstorm a theme for our second exhibition. We have then decided to focus on electrical engineering because electricity is the source of social and industrial development. The second exhibition in this series, named " Power! Source of Electricity", which the project plan was written by Director Chen, and the exhibition room was planned by Dr. Kuo. Along with Dr. Kuo, Prof. Weng has collected the references and visited facilities in order to compose a brief history on the development of electricity in Taiwan. We have also requested the Departments of Physics, Chemical Engineering, Mechanical Engineering, and Electrical Engineering to provide historical materials and experimental equipment for display.

The theme of the third exhibition was named "Railway to Success" to collaborate with Director Chen's research project (subsidized by the Ministry of Culture) which is a part of the national program in transforming the Taipei Railway Workshop into the national railway museum. We have prioritized this theme based on our recognition in which that railway infrastructures hold critical value in national defense, engineering construction, industrial and social development. Similarly, this exhibition project was led by Director Chen, with Dr. Kuo being in charge of the planning of the exhibition room. Additionally, we have invited the Directors of various departments, including Director Ching Fu Chen (Traffic Management), Director Chen-Ming Kuo (Civil Engineering), Director Tian Shiang Yang (Mechanical Engineering), and Prof. Chung De Chen to help provide courses and list of alumni for reference.

Goals and Prospects

Through exhibitions and promotional activities, not only we may acquire comprehensive and analytical knowledge on the developmental history of Taiwan's industry and higher education, but these exhibitions can also be an opportunity to feature the importance and uniqueness of our university. Additionally, these projects provide a chance to reflect with cultural and historical awareness on the future development of our university, higher education, and even the industries. Likewise, the NCKU can be recognized to be the most suitable school for this type of research in Taiwan at present with collaboration from fellow notable institutes.

Future Exhibitions

The theme for future exhibitions will be considered based on the following 3 criteria:

- 1. The importance as an infrastructure or industry;
- 2. The relevancy to the university's engineering departments;
- 3. Subsidy and conditional sponsorship from government agencies (i.e., the Ministry of Culture).

As a follow-up to the current exhibition (Railway), the theme of upcoming 4th exhibition has been decided as "seaports and ships".



臺灣工程教育史系列展 臺灣工程教育簡史



工程教育簡史 Brief History of Engineering Education

展示資訊 Exhibition Information	0
概論:臺灣工業教育與工程教育發展歷程概要 Overview: the Industrial Education and Engineering Education in	
Taiwan and their Development	2
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1945 ~ 1952 戰後復建期 Post War: Reconstruction Period 7 改制與升格 師資 校園出現女性教員與學生 首次聯合招生 校外實習 就業訓練及考試	0
1953 ~ 1962 美援時期 US-Aid Period	0
1963~1973 經建發展期 Economic Development Period	
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1973 ~ 1979 蓬勃發展期 Vigorous Development Period	
1979~ 1990 國防科技與新興科技	
Defense Technology and Emerging Technology 107 建立國防體系 軍工學合作體系的形成 大學院校相關科系的成立	
1990 ~之後調整期 Later Adjustment Period	
畢業生就業及對國家社會的貢獻 Alumni Contributions	
附錄 Appendices 114 展場開幕照片 展出文物	

參考資料



工程教育簡史

Brief History of Engineering Education

展示日期 2016.11.12 ~ 2019.09.30

工程教育在臺灣發展近百年,培育的人才對國家工程建 設及經濟發展作出重大的貢獻。成功大學自 1931 年起即為 臺灣培養工程師的重要學校,工程領域之系所數量冠全臺、 校友在各工程部門與產業舉足輕重、影響力深遠,對國家 工程建設及經濟發展貢獻良多。

因此,在他校配合下,由本校規劃進行蒐集、研究工程 教育史, 並展示其成果,以提供具歷史深度與文化內涵的 反思與洞察, 並推廣以發揚其精神。

Engineering education has developed in Taiwan for nearly a century, and has cradled talents that contribute immensely to national constructions and economic developments. Since 1931 National Cheng Kung University has been an important school in fostering engineers in Taiwan. With the most engineering departments in Taiwan, alumni have populated vast engineering sections and industries with profound influences and contributions to the nation's engineering construction and economic development.

With the cooperation of other institute, we have collected and studied the history of engineering education. The result is hereby displayed to provide a reflection and insight to the historical depth and cultural connotation, and to further promote the spirit of the subject.

展示資訊

Exhibition Information









展名	臺灣工程教育史展 - 簡史展
展出時間	2016年11月12日-2019年9月30日
展示地點	國立成功大學博物館 1 樓 1E5 展示室
策展人	翁鴻山、陳政宏、郭美芳、陳恒安、鄭麗玲
工作團隊	黄楷婷、林采樺、許靜慧、楊于萱、蔡靜婷、趙怡凱
照片提供	國立成功大學博物館、圖書館; 翁鴻山、陳政宏、郭美芳、鄭麗玲
文物提供	國立成功大學博物館、化工系、機械系、歐蓉蓉
老照片與公文檔 案授權單位	國立臺灣大學圖書館;國立台北科技大學、鄭麗玲; 國立成功大學博物館、化工系史館、機械系、文書組、 校友中心、歐蓉蓉
行政	江映青
英文翻譯	郭思餘、蘇筱彤
展版設計	蘇筱彤
美術設計與出圖	婕星設計



















Overview

臺灣工業教育與工程教育發展歷程概要

清廷於1885年在臺灣建省,任命劉銘傳為首任巡撫。劉銘傳抵臺後,採用歐 式近代教育,培養從事「洋務」的新進人材。1885年在臺北大稻埕的六館街(今 之永昌街)開設「西學堂」,教育英語、法文、地理、歷史、數學理科、測量繪 圖等。1886年在大稻埕建昌街(今延平北路,民生西路的十字路口),設立「電報 學堂」,傳授電報相關知識與技術。這二項措施,應是臺灣培育工程與工業人才 的開端;但是9年後,臺灣即被割讓予日本。

1895年,臺灣被割讓後,臺灣總督府為延續劉銘傳建設鐵路和通訊的政策, 於1900年起在國語(日語)學校,以特別科的形式設置電信和鐵道二科開授鐵路 運輸或電力通信的課程。領臺最初二十年間,工業主要以製糖、食品與紡織為 主,跟這些工業相關的機械工業為輔,所以工業技術僅透過總督府工業講習所(於1912年設置)傳授。但是俟第一次世界大戰結束(1918年),日本為了積極參與 世界經濟的競逐及向華南與南洋擴張勢力,遂開始在臺灣發展工業,將工業講習 所升格為臺北工業學校。隨後為培養高級技術員,1931年在臺南創設高等工業 學校,設置機械工學、電氣工學及應用化學三科基本工業學科。自1938年起, 為因應軍需工業的需求,在該校增設電氣化學科,並逐步在各地新設三年制和五 年制工業學校,至1944年共增設七所州立工業學校;復於1944年初,在臺南高 等工業學校增設土木和建築二科。

總督府為培養高級技術員並從事工業技術的基礎研究,用以推動臺灣工業化 及建設臺灣為南進基地,於1943年,在臺北帝國大學增設了內含機械工學、電 氣工學、應用化學與土木工學等四科的工學部。

戰後,教育體制和內容皆有重大的改變。加之,國民政府為建設臺灣,積極發展教育,在各縣市廣設職業學校。臺南高等工業學校在二戰前後,歷經二次改制,於1946年10月升格為臺灣省立工學院。韓戰爆發後,美國開始協防臺灣並給予經濟援助。不僅新購置許多教學和實驗設備及興建實習工廠和校舍,也對農工教育提供建議,其中施行單位行業訓練制與行業單位教學法,對改進工業教育有甚大的助益。此外1948年也將臺北工業學校升格為省立臺北工業專科學校。

1953 ~ 1960 年臺灣實施二期經濟建設計畫,對工業人才的需求逐漸增加,

因此政府除於1963年新設省立高雄工業專科學校外,也開放私人創辦專科學校,臺灣塑膠公司創辦人王永慶先生於同年設立私立明志工業專科學校。接著在短短的十年內,共新設私立工業專科學校高達20所,培育的人才對臺灣工業發展裨益甚大。政府復於1973年宣佈啟動十大建設,1979年開始推動十二項建設,對工程人才的需求更加殷切。自1990年代後期,開始實施專科學校改制政策,專科學校紛紛升格改制為技術學院。

為發展高級技職教育,並建構工業學校-工業專科學校-工業技術學院一貫之 工業技職教育,政府於1974年設立國立臺灣工業技術學院(今國立臺灣科技大學) 。1991年又增設國立雲林技術學院,將國立臺北工業專科學校改制升格為國立 臺北技術學院,增設國立高雄技術學院。其後因開放私人興辦技術學院(國內第 一所私立技術學院-朝陽技術學院於1994年開始招生),技術學院數量急遽的增 加。不久政府又放寬改制科技大學,因此科技大學校數大幅增加。

1950年代初期,臺灣經濟逐漸發展,工業界需才日益殷切,但是政府受限於 財力,就以增班的方式因應,但是同意設置私立大學校院。因此1955年有東海 大學與中原理工學院的創設。其後,又前後設立逢甲工商學院、中國文化學院二 所私立學院。1963年大同工業專科學校升格為大同工學院;接著在1966年淡江 文理學院增設工學部。此一時期,僅有國立中央大學新設二個工程學系及國立清 華大學新設三個工程學系;並於1974年創立國立臺灣工業技術學院。

其後近十五年並無新學院設立,而是在原有系或所增設研究所碩士班或博士 班。直至1989年起,才有企業公司和集團捐建元智工學院、高雄工學院(義守大 學前身)及長庚醫學院擴大為長庚醫學暨工程學院。公立大學方面,只有在1989 年國立中正大學先設資訊工程研究所,1991年增設國立雲林技術學院,以及 1998年將國立宜蘭農工專科學校升格為國立宜蘭技術學院。

影響工業教育與工程教育發展的因素

回顧臺灣工業教育與工程教育發展歷程,深受下列五個歷史變因的影響, 而這五個變因,也影響臺灣政治、經濟、教育和社會的發展:

 日本統治臺灣,將其藉明治維新由歐美引入日本的思想、制度、技術, 移殖到臺灣。民生工業由手工逐步改為機械化、使用電力,技藝由師徒 的傳授改在學校學習,傳統社會也逐漸現代化。

- 臺灣光復,引入中國化的教育、增設學校,台人受教機會大增;國民政府退據臺灣,勵精圖治,實施新土地政策,開始推行經建計畫,農民及一般民眾的生活逐漸獲得改善。
- 美援紓解了政府財政的困囤,在教育方面,不僅提供學校儀器設備、建築物,也引入教育的新思維與制度。在經濟方面,提供大量的資金和技術,促進農工業急速發展,人民生活大幅改善。
- 經濟蓬勃發展後,技術人員的需求殷切,政府透過增班、增系、核准復校、增設技術學院等政策因應;民間也有財力參與發展教育,新設大量的專科學校;在公私立大專學校大幅增設下,高中生與高職生的升學率大增。
- 1990年代中期,開始推動教育改革,其中包括增設大學,專科學校藉機 升格技術學院,進而改制為科技大學;以及調整入學方式,增加推薦入 學比率、推行多元入學;專科學校升格與調整入學方式二個政策,效果 難予定論。

臺灣大專校院的教學與研究在六十年代有顯著的變化,此種變化肇始於二 十世紀五十年代後期,許多工程領域開始以科學方法與理論來觀察、解析及研 究。此一趨勢不僅影響到大專院校的教學內涵及研究方向,也促成了相關學系 的設置。六十年代以後科技的突飛猛進,使得許多新領域嶄露頭角,包括材 料、資源、生物、生醫、光電、微機電等。九十年代起,奈米及新能源科技之 興起,使得相關科技之發表更加迅速。這些新領域的發展,也促使工程學系的 教學內容及研究方向進一步改變。

Overview: the Industrial Education and Engineering Education in Taiwan and their Development

In 1885, Taiwan was designated as a province by the Qing government, with Liu Mingchuan serving as the first Governor. As Governor, Liu has adopted a Western education system to train and educate youths to be engaged in foreign affairs. During the same year, the "Western School" was opened on Liu-Guan Street (present-day Yong-Chang Street) in Dadaocheng district, Taipei. Curriculums covered in the school included English, French, Geography, History, Mathematics, Science, and Surveying. Then, in 1886, the "Telegram School" was opened on Jian-Chang Street (present-day intersection of Yan-Ping North Road and Min-Sheng West Road), also in Dadaocheng district, to teach the know-hows and technology of telegraphy. These two schools were essentially the forerunners of Taiwanese modernization through training 20th century engineers fit for imminent industrialization. Yet, Taiwan was then ceded to the Empire of Japan just 9 years later.

In 1895, as the Japanese Colonization has begun, the Governor-General of Taiwan followed Liu's Westernization policies related to railways and communications, and initiated specialized curriculums on telecommunication and railway courses in Japanese school since 1900. During the first two decades of the Colonial Period, the industries in Taiwan were mainly sugar, food and textile, and were supplemented by the mechanical industries that were closely related to the equipment used by these 3 industries. Therefore, the know-hows to these mechanics were only taught in the Auxiliary Industrial Institute (established in 1912). However, as soon as the World War I was ended in 1918, Japan has adopted a more aggressive economic policy in Westernization to compete among the global economy with aspiration to expand its influence in Southern China and Southeast Asia. Industrialization was thus pushed in Taiwan, with uplifting the Auxiliary Industrial Institute to the Taipei Industrial School. Furthermore, in order to train even more specialized technicians, the Tainan Higher Technical College was established in 1931, with 3 fundamental engineering fields of mechanical engineering, electrical engineering, and applied chemistry as its core departments. Then, 1938, in order to cope with the militarization regimes, the Department of Electrical Chemistry was added to the College, while other 3-year and 5-year engineering schools began to emerge in other regions of Taiwan. By 1944, the government has established seven new state-level engineering schools, while two new departments of Civil Engineering and Architecture were added to the Tainan Higher Technical College.

In the meantime, in 1943, the the Faculty of Engineering, which encompasses the departments of Mechanical Engineering, Eletrical Engineering, Applied Chemistry, and Civil Engineering, was added to the Taipei Imperial University in order to train senior engineers and technicians, and to engage in research on industrial technology.

The education system in Taiwan has undergone drastic transformation after WW2 as the Japanese had handed over the island to the Chinese KMT government. In order to rebuild Taiwan, the KMT government proactively promoted modern

education, with several vocational schools established around the island. During which, the Tainan Higher Technical College was upgraded to Taiwan Provincial College of Engineering in October 1946 after its 2nd restructuring. After the outbreak of the Korean War, the United States began to help defend Taiwan and provide economic assistance. Not only did it purchase a lot of new teaching and experimental equipment and build internship factories and school buildings, but also provide advice on agricultural and industrial education. The implementation of the unit industry training system and industry unit teaching methods would greatly help improve industrial education. In addition, Taipei Industrial School was upgraded to the Provincial Taipei Institute of Technology (a junior technical college) in 1948.

As the the demand for industrial workforces has gradually increased due to the growth of industry prompted by the 1st and 2nd phases of the Four-year Economic Development Plan (1953—1960), in addition to the establishment of Kaohsiung Industrial Junior College in 1963, but has also approved the establishment of privately-funded engineering colleges. In the same year, Mr. Wang Yung-ching, the Founder of Formosa Plastics Corporation, established Ming Chi Institute of Technology. Private-run junior engineering colleges thrived and flourished from this new policy, which a total of 20 private junior engineering colleges were opened within a decade to provide the growing industries the workforces that were crucial to rapid development, followed by two more major construction projects which focused on regional and social infrastructures., and the demand for engineers increased further. During the late 1990s, the policy of restructuring junior colleges has been implemented, which many junior colleges of engineering have been upgraded to technical institutes.

In order to lay out a consistent education system for technical and vocational education and to integrate Industrial R&D with the higher tiers, the government then established the National Taiwan Institute of Technology (now National Taiwan University of Science and Technology) in 1974. In 1991, the National Yunlin Institute of Technology was added, the Provincial Taipei Institute of Technology, and added the National Kaohsiung Technical College. With the promotional policy for the opening of private technology, began enrollment in 1994), the number of technology colleges has increased dramatically. Overall, the number of technical colleges increased exponentially due to the new policy of the Ministry of Education which promoted vocational education. Soon after, many of these technical colleges were then uplifted into universities of science and technology during the late 1990's.

During the early 1950s, as the Taiwanese economy began to thrive, technical workforces were greatly demanded by the industries. However, because the government was limited by its financial resources, it could only respond to such demand by increasing the number of enrollment availability in existing universities while allowing the establishment of private institutes. Tunghai University and Chung Yuan Christian College of Science and Engineering were established under this policy in 1955, followed by Feng Chia College of Engineering and Business (1961) and College of Chinese Culture (1962). Then, in 1963, Tatung Institute of Technology

(1956) was accredited to be a four-year institute of technology. In 1966, a Department of Engineering was added to the Tamkang College of Arts and Sciences. In contrary to the flourishing private institutes, the national universities expanded less during this period, with only the National Central University and the National Tsing Hua University having established a few new engineering departments. In 1974, the National Taiwan Institute of Technology (NTIT) was also established.

After the establishment of NTIT, there was a vacant period of 15 years in which no new college was established. Instead, universities and colleges have expanded towards post-graduation education with Master's or PhD programs added to the existing departments or institutes. It was not until 1989 that numerous large corporations have funded for the establishment of Yuan Ze Institute of Technology and Kaohsiung Polytechnic Institute (the predecessor of I-Shou University), while Chang Gung Medical College was expanded into Chang Gung College of Medicine and Technology in 1993. In terms of national universities, the National Chung Cheng University had established the Institute of Information Engineering (1989), the National Yun-Lin Institute of Technology (1991), and the Taiwan Provincial Ilan School of Agriculture and Forestry was upgraded to the National Ilan Junior College of Agriculture and Technology in 1998.

Factors Affecting the Development of Engineering Education

Retrospectively, there are 5 historical factors which influenced the development process of Taiwan's industrial education and engineering education. These 5 factors had also affected Taiwan's political, economic, educational and social development:

- 1. The Japanese Colonial Period, which the Westernized ideology, regulations, and technologies were introduced from the Western worlds via Japan. The living sector industries which thrived on handicrafts were replaced machines operated by electricity. Skills were systematically taught in schools to replace the apprenticeship system.
- 2. The Restoration period by the Chinese KMT government, which the Chinese education system was introduced and the increased establishment of schools have granted more opportunity for Taiwanese people to receive education. After the Chinese Civil War, the KMT government turned to focus on Taiwan, which new policies were implemented to build infrastructure and to push industry development.
- 3. The US-Aid program had relieved the KMT government's difficulties over various aspects. In the education sector, the program had not only provided equipment and buildings, but also introduced new teaching methods and systems. Meanwhile, large quantities of economical assets and capitals were provided to support the rapid development of agriculture and industry.
- 4. As economic development grew vigorously, the demand for engineers and technical workforces grew, and the government has then responded to this demand with supportive policies to encourage enrollment quota, opening up new classes and departments, and has approved re-establishment of universities as well as the establishment of polytechnic colleges. The private

sector by this period has also harnessed enough financial resources to build educational institutes, which a large number of private polytechnic schools have been established.

5. The Taiwanese higher education reform began in the mid-1990s, which includes the reformation of technical colleges into technical universities. Furthermore, the new reformation policy promoted more lenient admission evaluation systems, which increased the admission ratio for all universities and colleges, although the long-term social effect of this reform is still being debated.

The teaching and research of Taiwanese colleges and universities have changed significantly in the 1960s. This transformation had begun to emerge during the late 1950s, when many engineering fields began to conduct studies using scientific methods and theories. This trend has not only affected the education methods and research directions in colleges and universities, but was also a key factor to the establishment of related departments. The rapid advancement of technology since the 1960s has sparked the emergence of new engineering fields, including materials, resources, biology, biomedicine, optoelectronics, micro-electro mechanics, and so on. Since the 1990s, the rise of nanotechnology and alternative-energy technologies has stimulated the large amount of publishing for research publications for these fields. The development of these new technological fields is in turn stimulating further transformation to the research directions of the engineering departments.



日本時代:工程教育奠基

Japanese Colonial Period: the Founding of Engineering Education

工業教育肇始之背景

日本時代為訓練現代化的技術勞 工,1912年開啟職工訓練,總督府始 設「工業講習所」,今臺北科技大學 前身。一戰期間歐陸戰亂,軍事與物 資轉移亞洲生產,日本受益,民生經 濟獲利提升,奠定南進利基,於大正 時期以臺灣為基地,以武力獲取東南 亞天然資源,做為日本帝國「南方生 命線」。為培育高級技術員,1931年 於臺南設置高等工業學校,即成功大 學前身。

1936年,啟用軍人背景小林躋造 為總督,他提出「皇民化、工業化、 南進基地化」之口號,臺灣成為南 進重要基地。1937年更積極準備南 進,以確保能源安全,喊出「大東亞 共榮圈」口號,將東亞納入其勢力範 圍。1938-1944年間於全臺陸續成立 工業學校,如臺中、花蓮、臺南、高 雄、嘉義、彰化、新竹等。1943年於 臺北帝國大學(即今臺灣大學)成立 南方研究中心及工學部,以服務軍事 需要及培育高級技術員。

The Initial Background of Industrial Education

In order to train modern technical labor during Japanese Colonial Period, the Governor-General of Taiwan founded the The Auxiliary Industrial Institute in 1912, precursor of National Taipei University of Technology. Due to WWI the production of military supply and commodity were shifted from Europe to Asia. Japan's livelihood and economy benefitted from such a shift, and thus established the foundation for its southward advance. During Japan's Taisho Period, Taiwan was "the southern life line" of the Japanese Empire, the base for launching military advances to acquire natural resources in Southeast Asia. In order to train even more specialized technicians, in 1931, the Governor-General of Taiwan established the Tainan Higher Technical College which later became National Cheng-Kung University.

In 1936 Kobayashi Seizo became the Governor with his military backgrounds. He manifested the slogan "imperialize, industrialize, fortify for southward advance", which Taiwan has become an important base for southward advance. While actively preparing for its southward advance in 1937, Japan has proclaimed "The Greater East Asia Co-Prosperity Sphere" which encompasses East Asia into its domain, and secure its resources. Between 1938 to 1944, industrial schools were founded all over Taiwan, in cities such as Taichung, Hualien, Tainan, Kaohsiung, Chiayi, Changhua, and Hsinchu. Taipei Imperial University (currently National Taiwan University) set up Southern Research Center and Faculty of Engineering in 1943, to fulfill military demand and to train senior technicians.

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臺灣總督府民政局學務部附屬工業講習所 The Auxiliary Industrial Institute of the Education Affairs Office of the Civil Administration Bureau

設校背景

1911年總督府擬設「工業學校」預算被削減, 而改為「講習所」,僅設「木工」、「金工及電 工」二科,招收臺籍學生。該所與已設之糖業、農 業講習所不同,跳脱農業而為工業,以職工訓練為 主。

1912年工業講習所設立時,全日本有103所修 業半年的「徒弟學校」,僅36所同此修業3年的工 業學校,引起日人注目,唯當時採取隔離政策,日 人無法入學而感到遺憾,故於1918年,原校地另設 「臺灣總督府工業學校」供日人就讀。

Founding Background

Due to budget cut in 1911, the Governor-General of Taiwan's plan for an "Industrial School" was reduced to "The Auxiliary Industrial Institute" instead, and only 2 sections ("Woodcraft" and "Metalwork and Electrical Engineering") were set up, in which Taiwanese students were accepted. This particular school was different from previous industrial schools set for sugar industry and agriculture for its strong focus on the training of industrial workers.

When the The Auxiliary Industrial Institute was founded in 1912, there were 103 "Apprentice Schools" which required 6 months apprenticeship in the entire Japan, while only 36 industrial schools providing 3 years' study terms existed. The new institute caught the attention among Japanese, but none was allowed to attend due to segregation policy. Therefore, a "the Industrial School of Governor-General of Taiwan" was founded for exclusive Japanese enrollment in 1918.



(70 7 のモモチ 訓令弟百五十 產 祸 러 序 的 クステ 现程左,通用足 こう公布 松風ノほという一副 一個 中寺 斩 ę 前頃 废 長ちて 1 规 臺邊經當府民政部考務都附屬二業請題所 饭, 殿換 勤 紫 抂 易 工業講習 長ノ 董陽 張斯用 民政 雪山 4 * Ŧ rti II 1 慶 Ť. 能 キレチ -葩 ş 12 龍 就 いり 坊 -3 4 大学 辰 × 五四書切り提 庭 헿 a 1 打學湯 明 --辑 -属 博, 新男ノ信用をたこ 27 炭 、工業二世紀 * 0 R 福精 布 , 書 三箇年 经库 17 2 堡 明治ビナム年 产行 枳 7 義成 ちしい 孝 部業物部附 赩 大 * =1 行く 繇 御を 100 安座二五 東ノ 14 佳 置 度 禄 高二素 優美男ア以子 ~~~!!!! 电 茶 唐 Ę 巷 校街の数 いま・ 一同题促 玩 7 十二章秋御 所スチリ 行上し記 南 定 ? 定 情袋 2 清政 もノ 藏 橋 えて 麗 坟 員 若 FIT BP 1 a

1914年民政局學務部附屬工業講習所設立公文(國史館臺灣文獻館) Official Document of the establishment of Auxiliary Industrial Institute



(臺北科技大學文化事業發展系鄭麗玲教授提供)



臺北州立臺北工業學校校門與校旗 (臺北科技大學授權) The front gate and school flag of Taipei Industrial School

校名

1919年「講習所」 調整為與日本近似的 「工業學校」之名, 與農業、商業共同規 範在實業教育之下; 並應時代所需增設應 用化學科。

Name of the School

In 1919, the term "The Auxiliary Industrial Institute" was replaced with "Industrial School" to match with other similar schools in Japan. Along with other agriculture and business schools, which all 3 types of vocational institutes have become regulated under industrial education. The section of Applied Chemistry was established at the same time to meet with industry demands.



臺北州立臺北工業學校校門與學生 (臺北科技大學授權;文化事業發展系鄭麗玲教授提供) Students of Taipei Industrial School standing in front of the gate

講習所生徒來源

首次招生設臺北、 臺中、臺南(含屏東、 高雄、臺南、嘉義、 澎湖)等3試場,招收 60名,報名踴躍有351 人。揭榜時有兩位臺 南地區學生。

Source of the Students

The exams for the first recruitment were held in Taipei, Taichung and Tainan (including students from Pingtung, Kaohsiung, Tainan, Chiayi, and Penghu). 351 students competed for the quota of 60. Two students from Tainan were admitted.

「工場」與「學理」本位之分

「講習所」名稱與日本國內三年制 乙種工業學校有別,曾議論設於殖產 局下,以「工場」為本業,著眼訓練 技術工人。1912年課表以工場實習課 程佔多數,但仍重視「學生本位」原 則,也安排「數學」、「理科」、「 英語」、「製圖」等理學基礎科目。

學期制與課程

初設時分三學期,1913年改為兩 學期。1917年前設兩大科下再設小 分科,所學內容多對應技術人員名 稱。1919年更名為「公立臺北工業學 校」重新增設與合併,計有機械、電 氣、應用化學、土木建築、家具、金 屬細工等六科。

1945年之前臺北工業學校機械科在學校工廠的 實習(臺北科技大學文化事業發展系鄭麗玲教 授提供)

Factory Practicum in Taipei Industrial School before 1945

Distinction between Practice and Theory

Since the Auxiliary Industrial Institute was different from the 3-years Type B industrial schools in Japan, it was proposed to be managed by the Production Bureau, and focused on training skilled workers through workshop practice. The 1912 curriculum showed that the majority of courses were being held in workshops. Meanwhile, basic science and humanities courses were also provided, such as Mathematics, Science, English, and Cartography.

Terms and Curriculum

In the beginning, the school has operated based on trimester per academic year, then changed to two semesters during 1913. The school's name was changed to the "Taipei Industrial School of Taiwan (Public)" in 1919 with 6 departments reorganized: Mechanical Engineering, Electrical Engineering, Applied Chemistry, Civil Engineering, Architecture, Furniture, and Metal Crafting.



工業講習所(下載自《百年風華 - 臺北科技大學校史》) Auxiliary Industrial Institute (Courtesy of National Taipei University of Technology, Gallery of Campus History)



就業與就學

Employment and Graduated Study

1915年首屆畢業生 51人中有39人至官方機 構任職,達到替公私部 門提供工業需求人才的 目的。 39 out of the 51 first graduates (class of 1915) have begun their careers in the public sector, which has fulfilled the demand for industrial workforces in both public and private industrial sectors.





冬季制服的大衣(往日本畢業旅行時的穿著) (臺北科技大學文化事業發展系鄭麗玲教授提供) Coat uniform for winter

1945 年之前臺北工業學校應用化學科天平室 (臺北科技大學文化事業發展系鄭麗玲教授提供) Balance practium class, Applied Chemistry before 1945



校地與學制

1920年代後期,臺灣島內工業已次第發展,南部工業建設計畫和日本政府 南進政策,皆迫切需要高級工程技術人才,且為進一步提昇臺灣的工業教育水 準,臺灣總督府遂有創設高等工業學校的計畫。適逢1927年日本發生金融恐 慌,總督府決定廢止臺南高等商業學校,另設立高等工業學校,在臺南仕紳慷 慨捐地後,終於在1931年正式成立。

Campus and Academic System

In the late 1920s, the systematic effort of the Japanese in developing the industry in Taiwan has begun to show visible progress. Meanwhile, because the policies on improving industries in Southern Taiwan and the Japanese Southward Policy both urgently required senior engineering and technical personnel. In order to further improve the level of industrial education in Taiwan, the Governor-General of Taiwan has planned to open a higher level technical college.

Followed by the outbreak of Shōwa financial crisis in 1927, which has prompted the Governor-General to shut down Tainan Higher Business School, Tainan Higher Technical College was able to be established in 1931 with land donated by local gentries to serve as its campus.

設校背景

1931年4月舉辦第一屆入學的「臺南高等工業學校」,設有機械、電氣兩 工學及應用化學等三科,是慎重評估產業需求及工業化未來而設置。當時設校 重任委託曾創設滿州工業學校的今景彥,他曾派遣科長赴歐美調查研究,努力 接軌國際。

Founding Background

In the April of 1931, Tainan Higher Technical College was established with three departments: Mechanical Engineering, Electrical Engineering, and Applied Chemistry. The planning of the College was led by Kagehiko Kon, who had founded the Manchu Industrial School. Kon had sent his colleagues to Europe and America to closely study the international trend.



1937 年臺南高等工業學校校門 (若槻尚子捐;成大博物館典藏) Front gate of Tainan Higher Technical College, 1937

師資

創校之初,日本帝國境 內僅本校新創,師資選擇空 間較廣而以帝大系統為主, 如1933年包括校長在內的26 名師資,帝大系統出身者佔 15名。

以機械系為例,1-2年級實習與實驗時數為 每週6小時,3年級則降為4與3小時,然而設計 與製圖1-2年約為5-8小時,3年級則升至11與 20小時,此課程名稱有「設計」一詞與臺北工 業學校不同,充分表現高等工業教育,要求學 生具備設計能力,非僅製圖能力。

Faculty

Courses

課程與名稱

When the Tainan Higher Technical College was established, it was the only new industrial school founded by the Imperial Japan. Thus, the majority of faculty members came from backgrounds related to the imperial universities, which 15 out of 26 faculties, including the principal, have obtained their degrees from imperial universities. Take Mechanical Engineering for example, the required 6 hours practice and experiment weekly during the first two years were reduced to 4 and 3 hours on the third, whereas "Design and Cartography" increased from the required 5-8 hours weekly during the first two years into a required 11 and 20 hours during the third year. Apart from Taipei Industrial School, the name of this course consisted of "Design". This fully illustrated a higher industrial education, which demanded not only of the students' drawing abilities but also of their designing abilities.

臺南高等工業學校學生(若槻尚子捐;成大博物館典藏) Students of Tainan Higher Technical College



擴充與改名

1934年日月潭發電所竣工,高耗電工業興起;1937年中日戰爭開始,接著 受二戰影響,為因應國防工業及配合包括肥料、鹼業、鋁業等實業界之需要, 於1940年增設電氣化學科。於1944年改稱「臺灣總督府臺南工業專門學校」 ,並增設「土木」與「建築」兩工程科。

Expansion and Rename

The industries with high power consumption began to thrive in Taiwan after the Sun Moon Lake Electricity Reservoir was completed in 1934. With the start of the Sino-Japanese War in 1937, followed by WWII, the demands from the military industries including fertilizer, alkalis, and aluminum, the Department of Electrochemistry was added to the College in 1940. In 1944, the College was renamed as the "Tainan Specialized College of Engineering of the Governor-General of Taiwan" with the addition of another 2 engineering departments: Civil Engineering and Architecture.

1931 年臺南高等工業學校第一屆入學宣誓典禮(南國首工拾年紀) 右側為教師,學生後方為家長,講台上者為首任校長若槻道隆 The first Commence Ceremony of Tainan Higher Technical College





臺北帝國大學 Taipei Imperial University

設校背景

1928年成立的「臺北 帝國大學」也依據日本「 大學令」而設,然以「工 業日本,農業臺灣」之殖 民地考量,未設工學部。 當時伊澤總督力主該校應 以發展臺灣文化中心為創 設目標,而設文政學部與 理農學部。

Founding Background

The Taipei Imperial University was founded in 1928 based on Japanese University Law, during which the colonization policy of Imperial Japan has planned to keep the industrial development within Japan and promoted agriculture in Taiwan. The establishment of the Faculty of Engineering was thus not been included in the university. Furthermore, Izawa Takio, Governor-General of Taiwan at the time, has envisioned the Taipei Imperial University to develop a Taiwanese cultural center, thus the Faculty of Literature and Politics, and the Faculty of Science and Agriculture were established.



1940 年臺北帝大校門(臺大校史館授權) Main gate of Taipei Imperial University, 1940 (Courtesy of Gallery of NTU History)



設立工學部背景

Founding Backgrounds of the Faculty of Engineering

In 1937, Japan became more proactive in the preparation for its southward advance, which it has announced a "Greater East Asia Co-Prosperity Sphere" policy that encompassed Eastern Asia into its domain. At the peak of the War in 1943, the Taipei Imperial University has not only set up the Southern Research Center, but also the Faculty of Engineering to train senior-level technicians to conduct researches on fundamental engineering technology. The Faculty of Engineering includes 4 sections: Civil Engineering, Mechanical Engineering, Electrical Engineering, and Applied Chemistry, each with 6 lectures and 7 general lectures.



臺北帝國大學學生於校門口合照(臺大校史館授權) Students of Taipei Imperial University at the front gate (Courtesy of Gallery of NTU History)

校舍

Campus Buildings

Agriculture and Forestry.

由於戰爭,工學部教 學設備準備不如預期,開 學後於臨時校舍,即前農 林專門部二幢木造校舍開 始授業。

師資

Faculty

時局緊迫,延聘教授 困難,乃懇託東京帝大工 學部努力物色,因此, 師資大多來自東京帝大理 學部與工學部,部分則以 總督府電氣相關技術官轉 任。 It was difficult to sustain employment for professors amidst the intensity of the War, and the university sought out the help from Tokyo Imperial University. The majority of the faculty members therefore came from the Faculty of Science and Faculty of Engineering at Tokyo Imperial University, while some of the other members were technical officers in electrics transferred from the Governor-General's Office.

Due to the War, the teaching equipment for the Faculty of Engineering was underprepared, and the

faculties had to begin the courses in 2 temporary

buildings previously owned by the Faculty of



1934 年臺北帝國大學全景(臺大校史館授權) Aerial view of the university campus, 1934 (Courtesy of Gallery of NTU History)



臺北帝大工學部同學於館舍前合照(篠田嘉道家族照片、臺大校史館授權) Students of the Engineering Department in front of the department building (Courtesy of Gallery of NTU History)

設備與器材

工學部器材因戰爭尚 未運抵臺灣即遭炸毀, 學生在戰爭結束前的短 暫兩年,曾到臺北工業 學校借用相關專業實驗 室實習。

Facilities & Equipment

As the equipment acquired for the Faculty of Engineering were unfortunately destroyed by bombings before it could be delivered to Taiwan, students had received their practium courses in specialized laboratories borrowed from the Taipei Industrial School throughout the final 2 years of the War.





穿制服的臺北帝大預科生 (篠田嘉道家族照片、臺大校史館授權) Matriculation students in their uniforms (Courtesy of Gallery of NTU History)

學生來源

首屆入學計52人, 一半預科直升,一半招 考入學,三年可取得學 位。當時臺人受限於報 考資格,第一屆僅機 械、應化各一位臺人。 第二屆57人也僅4臺人。

Source of the Students

Among the first 52 students, half of them came straight from preparatory school, while the other half were admitted trough entrance exam, and all were expected to obtain their degrees after 3 years' study. Due to the segregation policies against the Taiwanese, there were only one Taiwanese graduate each in Mechanical Engineering and Applied Chemistry, and there were only 4 Taiwanese out of 57 university graduates in the following year.

戰後復建期(1945~1952)

Post War: Reconstruction Period (1945~1952)

改制與升格

戰後,政府為培育復建人才、建設 臺灣,積極發展教育,不復有臺/日籍 學生比例的限制,又在各縣市廣設職 業學校,學校和學生數遽增,國民受 教機會大增。1950年初期,臺灣經濟 逐漸發展,工業界需才殷切,政府受 限於財力,以增班方式因應。

在教育體制和內容的改變上,臺北 帝國大學改名臺灣大學,工學部改稱 工學院;1946年2月臺南工業專門學 校改制為專科學校,同年10月升格為 臺灣省立工學院;各「科」也以「學 系」稱之。1948年臺北工業學校改制 為省立臺北工業專科學校,各州立工 業學校改稱省立工業職業學校。私校 僅開南商工與大同工業兩職校,及建 國初級工業職業學校等共三所。

將一學年分三學期的制度改為兩學 期;學制上,初職招收國校畢業生, 高職招收初中或初職畢業生,修業年 限各為三年。後為改進初職畢業生就 業不易的缺點,逐漸廢止初職增設高 職。

Re-organization and Upgrade

After the war, the KMT government proactively reformed the education system in order to train new generations for a smoother social and national restoration. As the Taiwanese people were no longer restricted from higher education by the Japanese segregation policies, and the number of vocational schools increased, education became far more accessible than before. During the 1950's, as the economy of Taiwan began to develop, the workforces demand from industries has risen, which the government has responded by increasing the enrollment availability due to the lack of educational budget.

In terms of the changes in educational system, Taipei Imperial University was renamed National Taiwan University, and College of Engineering instead of Faculty of Engineering. Tainan Higher Technical College was re-organized as Taiwan Provincial Tainan Junior College of Technology in February, 1946, and upgraded into Taiwan Provincial College of Engineering in October the same year. In 1948, Taipei Industrial School was re-organized into Taiwan Provincial Taipei Institute of Technology (a junior college). All Prefecture Industrial Schools were renamed Provincial Industrial Vocational Schools. There were only 3 private schools: Kainan Business and Industrial Vocational School, Tatung Industrial Vocational School, and Jianguo Junior Industrial Vocational School.

The original system that divided an academic year into trimesters was switched to semesters instead. Through the system, elementary vocational schools were to recruit graduates from primary schools, and vocational high schools from junior high schools and elementary vocational schools. The study term was set at 3 years. Due to the difficulties for the elementary vocational school graduates to obtain employment, elementary vocational schools were gradually replaced by vocational high schools.



1951 年省立工學院校門與校旗(40 級胡飛鵬 捐機械系提供) The flag of Taiwan Provincial College of Engineering being placed in front of the main gate, 1951



省立工學院機械工廠 (40 級胡飛鵬捐;機械系提供) Practium Factory of the Mechanical Engineering Department, Taiwan Provincial College of Engineering

師資

戰後,臺籍教員比例 不及1/10,省教育當局採 取補救措施:1. 准予留用 日籍教師;2. 至福建、北 京、上海徵聘教員。迨至 1949年,大批教師隨政府 來臺,方解決師荒問題。

Faculty

After the war, Taiwanese teachers consisted of less than 1/10 the faculty. Educational officials of the provincial government remedied the problem in two ways: 1. Allowing Japanese teacher to stay. 2. Employ teachers from Fujian, Beijing, and Shanghai. The problem was finally resolved by the grand amount of teachers that followed the government retreat to Taiwan in 1949.


1947 年水池邊的工學院女生(王秀蓮捐;成大博物館典藏) Female students at the pond in front of the main building, 1947

校園出現女性教員 與學生

日本時代工業類的專 校與大學未見女性教師與 學生,然在日籍教師遣 返後,自大陸招聘的師 資讓校園中始見女性教 師。1947年省立工學院函 請南部女中校長鼓勵學生 報考該校,該年即錄取12 位女學生。

Female Teachers and Students on Campus

No female teacher or student was ever seen in an industrial college or university during Japanese Colonial Period. After the Japanese teachers were repatriated, female teachers were first seen on campus through employment from Mainland China. In 1947, Taiwan Provincial College of Engineering had pleaded for the principles of girls' high schools in southern Taiwan to encourage their students to enroll, which 12 female students were admitted in the same year.

省立學院聯合招生

1947年,教育廳函請省 立師範學院、省立農學院 及省立工學院三所省立學 院聯合招生,分臺北、臺 中、臺南三區同時舉行, 為臺灣各大學層級院校聯 合招生之始。1948、1949 年仍依例辦理;但是1950 年各校單獨招生。

四院校聯合招生

1954年在教育部的協調 下,國立臺灣大學與三所 省立學院首次聯合招生, 也在臺北、臺中、臺南三 區同時舉行;隔年,1955 年國立政治大學加入聯 招,其後不僅每年舉辦, 三年制專科學校、新設立 的院校及軍事院校也陸續 加入,由各校輪流主辦。

First Joint Recruitment of Provincial Colleges

In 1947, the Department of Education has requested Taiwan Provincial Teachers' College, Taiwan Provincial College of Agriculture, and Taiwan Provincial College of Engineering to initiate a joint recuitment event, which were held in Taipei, Taichung, and Tainan at the same time. It was the first joint recuitment event for higher education to be held in Taiwan, which was also held in 1948 and 1949; however, the 3 colleges began to recruit students seperately in 1950.

First Joint Recruitment

In 1954, the National Taiwan University and the three provincial colleges reinitiated the joint recruitment event through the coordination by the Ministry of Education. The event was also held in Taipei, Taichung, and Tainan at the same time. In the following year of 1955, National Chengchi University joined the joint recruitment, which has become an annual event. In the following years, many higher education institues have joined the event, including 3-year colleges, newly established academies, and military academies, which the institues would take turn to be the organizer of the event.

機械工廠(40級胡飛鵬捐;機械系提供) Practium Factory of the Mechanical Engineering Department



機械系暑假學生實習(成大黑白攝影社) Students from the Department of Mechanical Engineering recrieving training in an automobile mechanics shop during summer vactaion.

校外實習

以省立工學院為例,於 1947年起即與資源委員會 合作,請其轄下單位提供 學生實習場所,規定學生 畢業前需完成6個月實習, 後修訂為4個月,施行到 1959年,暑期軍事集訓開 始實施時才改為2個月。至 1987年因學生人數太多, 實習場所嚴重不足被迫改 為選修。

Off Campus Internship

In the case of Provincial College of Engineering, the cooperation with Resource Committee started as early as 1947, with sites provided by the committee's auxiliary units. Students were required to complete a 6-month internship period before graduation. This requirement was later reduced to 4 months, which has remained until 1959 when it was further reduced to 2 months due to the addition of military training in summer vacation. In 1987, the internship program was changed into an elective course due to the number of students have exceeded beyond the availability of internship opportunities.

1948 年化工系女學生於工廠實習(成大黑白攝影社) Female student from the Department of Chemical Engineering conducting tests during the practium program in the factory, 1948



1951 年港口實習 Port service training, 1951

就業訓練及考試

1949年起,政府安排全臺職業學校及省立農、工學院畢業生千餘人,在臺 北訓練兩週,成績及格者由政府分發試用半年,經服務機關考核成績優良者, 分別補缺實授。1950年起,可參加就業考試,及格經訓練結業再予分發就業。 1951年改為就業審查、訓練改為講習。1952年起,由考試院委託省政府辦理, 考試及格者再予訓練。1953年起,因集中軍訓,就業訓練停辦,就業考試仍 繼續舉行。

Employment Training and Exam

Starting from 1949, more than a thousand graduates from vocational schools and provincial colleges of agriculture and engineering were trained in Taipei for two weeks through government arrangements. Those who have passed through the training with acceptable score rankings would be assigned to their temporary posts for 6 months. Among them, permanent positions would be assigned to those who have received high rankings based on assessment to their performances on their 6-month temporary position. Starting from 1950, employment exam was also required. Those who qualified would be employed after completing further training. Starting from 1951, exam was replaced by census, and training was replaced by lectures. Starting from 1952, provincial government was commissioned by the Examination Yuan to execute employment exams. Those who have passed the exams would be further trained. Starting from 1953, employment training have ceased due to collective military training, while employment exam continued.

省立工學院機械實習工廠 (40 級胡飛鵬捐;機械系提供) The exterior of the Practium Factory of the Mechanical Engineering Department, Provincial College of Engineering



省立工學院冷凍實驗室(38 級李國璿捐;機械系提供) Refrigeration laboratory, Provincial College of Engineering



省立工學院蒸氣機實驗室 (38 級李國璿捐;機械系提 供) Steam engine laboratory, Provincial College of Engineering



微粉體實驗室(38級李國璿 捐;機械系提供) Micro powder labratory



省立工學院實驗室(40級胡飛鵬捐;機械系提供) Laboratory, Provincial College of Engineering



省立工學院水力實驗室(40級胡飛鵬捐;機械系提供) Hydraulics laboratory, Provincial College of Engineering

美援時期(1953~1962)

US-Aid Period (1953~1962)

美援時期

US-Aid Period

二戰後,美國因應韓 戰,透過美援機構及派駐當 地之顧問直接掌控援助經 費。工程教育為美援最早實 施的教育計畫,使1950年 後,因美援的挹注以及美式 教育理念的導入,臺灣中等 以上的工程教育,有著巨幅 的改變。 After WWII, in response to the Korean War, the US assumed direct control over the aiding fund through the agencies and the military advisory located on site. Engineering Education was among the earliest educational plan funded by US-Aid. The investment of US-Aid and the introduction of the American educational theories resulted in a remarkable change in the engineering education in Taiwan.

1953 年教師節省立工學院歡迎美籍教授來臺紀念合照 (標註外國人名者為美援時期普渡大學派赴本校之各系顧問) The visiting professors of Purdue University and faculties of Taiwan Provincial College of Engineering, 1953



美援計畫標幟 (採自成大化工系典藏儀器標籤) US Aid Logo

培育工職學校師資

1953年,在省立師範學 院成立工業教育學系,成為 首座培育臺灣工職學校師資 中心。並與賓州州立大學簽 訂合約,中美雙方所協定教 育政策,採取共同調查、討 論,尋找適合改革臺灣職業 教育的方式。

Training Teachers for Industrial Vocational Schools

In 1953, the Department of Industrial Education was set up in the Provincial College of Education. This became the center where the teachers for industrial vocational schools were trained. By signing agreements with Pennsylvania State University, educational policies were set by both parties after investigating, discussing, and searching in coalition, to find the optimal way to reform vocational education in Taiwan.



成大秦大鈞校長與普渡大學傅立爾教授(土木系 顧問)於總辦公廳校長辦公室商議 President Ta-Kuin Tsing of PCKU and Consultant Prof. W.I. Freel meeting in the President's Office

施行單位行業訓練制

1953年,臺灣共有初、高級工業職校18所,設置科別分為機械、電機、 化工、土木及礦冶5科。依校規模設1~5科,但每科範圍太廣、教學過於理論 化,培育的畢業生不受工業界歡迎。教育部為改進問題,於1954年採用美國 施行的單位行業訓練制與行業單位教學法,在8所工業職業學校實施,成為「 工職示範計劃」的開始,並強調示範學校應配合所在地之工業活動,充分利用 工廠設備以利學生實習。

Applying Occupational Specific Training System

There were 18 elementary and higher industrial vocational schools in Taiwan during 1953. Each school included 1~5 of the following departments depending on its scale: Mechanical Engineering, Electrical Engineering, Chemical Engineering, Civil Engineering, and Mining and Metallurgical. However, due to the scope being less specialized and the curriculum being too theoretical, graduates from these schools weren't well-received by the industries. To counter this issue, the Ministry of Education implemented the tnit industry training system and industry unit teaching method in 1954. The method was conducted in 8 industrial vocational high schools as the initiative of the "industrial vocational demonstration project". The emphasis was set on demonstrating the collaboration of school curriculum with regional industrial activities, while utilizing factory facilities to benefit student practicum.

1956 年省立成功大學交流電機實驗室 A. C. Machinery Laboratory, PCKU, 1956



1956 年省立成功大學材料測試實驗室 Materials Testing Laboratory, PCKU, 1956



1956 年省立成功大學水工試驗室之試驗模型 Testing Model in Hydraulic Laboratory, PCKU, 1956

改善大專工程教育

此時期,設有工程科系仍只有日本時代創 校的三座院校(臺灣大學、臺北工專、省立工 學院)未再增設相關校院。其中省立工學院於 1953年6月開始至1962年止,陸續與美國普渡 大學(Purdue University)簽訂數次合作協議, 期間普渡大學提供教學設備與資源的援助、派 遺相關系所教授團長期駐校,為各科系教學研 究與校務行政總體檢;協助該院訂定課程及改 善教學方法,包括調整課程、釐定教材大綱、 根據教學需要充實設備。同時提供該校教師赴 美訪問觀摩學習的名額。

Improving College Engineering Education

At that time, there were only three institutes founded in the Japanese Colonial Period with engineering departments, and no others were established. From June 1953 to 1962, Taiwan Provincial College of Engineering had negotiated and signed several agreements with Purdue University. During that period, Purdue University helped providing teaching equipment and resources, long term on campus faculty support for related departments, and thorough examinations of departmental teaching, research, and administration. It also helped formulating curriculum and improving teaching methods, which includes: adjusting courses, setting syllabus, adding equipment according to teaching needs. In the meantime, opportunities were offered to local faculties to visit and observe in the U.S.

1959 年省立成功大學化工系單元操作實驗室蒸餾塔 塔中央穿黑色上衣者為普渡大學顧問塔克教授 Distillation Column in the Unit Operation Laboratory, Department of Chemical Engineering, PCKU, 1959



1956 年省立成功大學機械實習工廠 Machine Shop, PCKU, 1956



擴建成功廳(徐立夫相冊) The enlarged Cheng Kung Hall

改善設備與基礎建設

普渡顧問亦重視圖書與改善校園基礎建設,並向美國廠商訂購大量圖書、 儀器與設備,興建新式圖書館、學生活動中心、保健室、及三棟僑生宿舍,增 建機械、電機和化工等系之實驗室與實習工廠,改善教學研究空間。將背誦式 教學改採實作為主,重視小班研討、分組實驗,教授到場監督,學生自行清理 實驗裝備與設施,要求學生成績符合學術標準等。合作期間來校顧問前後達16 人,出國考察與進修者先後達28人,遂而改善該校體質,為蛻變為臺灣一流大 學打下基礎。

Improving Facilities and Infrastructures

Advisors from Purdue University took serious account into improving the library collection and campus infrastructure: they ordered a great deal of books, instruments and equipment, and built a new library, a student activity center, infirmary, and three dormitories for overseas Chinese students. They also expanded and improved the laboratories and training workshops of various departments such as Mechanical Engineering, Electrical Engineering, Chemical Engineering, etc. for teaching and research. Teaching style was transformed from recital to practical. With emphases on small group discussions and experiments, students were to clean up lab equipment and facilities under the supervision of the professor, and to meet the academic criteria in their results. During the cooperation period, a total of 16 advisors came from Purdue, and 28 local faculty members had the opportunity to investigate and advance their studies abroad.

成大新建總圖書館(徐立夫相冊) The newly built main library of PCKU

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1959 年省立成功大學化工系蒸發器系統 Distillation Column, Department of Chemical Engineering, PCKU 1959

成立新設科系

臺北工業專科學校最初僅獲得小額美援剩餘款,後來美方也同意予以持續 補助,介紹普渡大學與該校合作。金額雖不多,然而協助該校成立電子科,對 培育電子方面專才助益甚大。

Establishing New Departments

Taiwan Provincial Taipei Institute of Technology had originally only received a fraction of remaining funds from the US-Aid program before being approved for further funding later on, with additional cooperation opportunity with Purdue University. Despite the small budget, the school has managed to utilize it to set up the Department of Electronics, which was crucial to train workforces specialized in electronics.



省立工學院熱力實驗室 Thermal experiemnt laboratory, Provincial College of Engineering

經建發展期 (1963~1973)

Economic Development Period (1963-1973)

新設大量工專

1953 ~ 1960 年,臺灣實施二期經建計畫後,工業人才需求漸增,政府於 1963年除同意大同工專改制為大同工學院外,新設省立高雄工專,也開放私 辦專校,同年臺塑王永慶先生設立私立明志工專。短短十年內,共新設私立工 業專科學校近20所,培育的人才對臺灣工業發展裨益甚大。

A Boom in the Number of New Engineering Schools

With the execution of the two Economic Development Plans in Taiwan between 1953 to 1960, the demand for industrial workforces has increased gradually. In 1963, Tatung Institute of Technology was upgraded into Tatung College of Technology, and along with the newly established Provincial Kaohsiung Institute of Technology, private institutes of technology were opened for attendance as well. Ming Chi Institute of Technology was established by Mr. Y. C. Wang, founder of Formosa Plastics Group during the same year. Within a decade, nearly 20 institutes of technology were obsted significantly to the development of industries in Taiwan.



1960 年省立成功大學化工系熱交換器實驗 Heat exchanger experiment, Department of Chemical engineering, PCKU, 1960



1971 年國立成功大學礦冶及材料學系分譜分析 實驗(成大概況) Spectrial Analysis experiment, Department of Mining & Metallurgy, NCKU, 1971



省立工學院礦冶系選礦實驗室 Mineral Processing Laboratory, Department of Mining & Metallurgy, Provincial College of Engineering

開始設立環工系

對於臺灣境內污染的問題,政府先前著重垃圾、下水道與自來水的處理。 所以只在土木科系中傳授相關的檢測和處理技術,後來就在土木科系分設衛生 工程組。迨至1970年代,工業急速發展,工廠、用電、車輛陸續增加,復因 大型工程建設隨之展開,空氣、水及土壤汙染日趨嚴重。政府為因應此一趨 勢,才在行政院及縣市政府也設置環保單位;也因為需培育監測、管理及處理 汙染物的人才,遂逐步在公立大專校院設置環境工程科系,也鼓勵私立校院創 設。成功大學與中興大學於1976年領先設立環工系。

The Emergence of the Department of Environmental Engineering

Regarding the problem of pollution in Taiwan, the government first focused on the treatment of waste, sewage, and tap water, which the relevant technologies and skills for detection and processing were taught in the Department of Civil Engineering. Later, sub-major on Sanitary Engineering was established under the department. By the 1970s, as industry rapidly developed, the number of factories, power consumption, and vehicles continued to grow. Meanwhile, the initiation of national infrastructure construction projects has further amplified the pollution scale over air, water, and soil. As a response, the government has also set up environmental protection units in the Executive Yuan as well as city and county governments. Also, to respond to the new demand for human resources to monitor, manage, or process pollutants, public universities and colleges began to establish environmental engineering departments, while private schools were encouraged to follow suit. National Cheng Kung University and National Chung Hsing University were the first two universities in Taiwan to have established the Department of Environmental Engineering in 1976.

Application for Local Currency Grant Aid Funds Ap. 17, 1970 1. Project Number: 2. Project Title: Aiding Cheng Kung University in its new department and divisions. 3. Starting Date: August 1, 1969, Estimated Completion Date: July 1972. 4. Bridf Description and Purpose of Project: To meet the need for our economic development as well as to keep pace with the rapid progress in economic construction, we are now establishing the Naval Architectural Department, division of space geodesy, and Graduate School of Mining Metallurgical and Material Science. To carry out these newly establishing project and to bring up those recently established departments a fund-aid is urgently needed for procuring up-to-date instruments and equipment. 5. Loan or Grant: Grant. 5. Amount of Fund Requested and Matching Fund: (1) Aid fund: Department of Naval Architectural Engineering Nis 1,300,000 Total: Nt\$ 1,300,000 (2) Matching fund: Department of Naval Architectural Engineering Nt# 1,200,000 Nto 1,200,000 Total: 7. Fund Required Breakdown Frocurement Department of Naval Architectural Engineering,.... Nt\$ 1,300,000 Total: Nt\$ 1,300,000 8. Desired Schedule of Fund Releases Please release in one lump sum when projects are approved 9. Name and Full Title of Applicant Cheng Kung University 10. Address and Telephono Number of Applicant No. 1 Ta-Hsuch Road, Tainan, Taiwan To1 24141-24149 Yun-Pin Lo, Provident Signature of Applicant Signature of Sponsoring Agency

1970年成功大學增設造船系及航太系由美援補助經費 Approvement of budget in establishing the Department of Naval Engineering and the Department of Aeronautics, 1970

課程變革

日本時代,課程皆因應 國策、企業與民間需求而安 排及調整。中日戰爭及二戰 **開戰後,因應軍事工業與動** 員,增設相關學科、調整教 學為實用化,甚至縮短修業 年限。戰後,因教育体制不 同、順應國策,課程大幅改 變。1948年教育部修訂公 布大學共同必修科目表,規 定最少需修滿142學分方得 畢業。1958、1965、1972 、1977、1983年分別再次修 訂。其中1965年因應國際教 育與學術潮流,課程大幅修 訂。

Curriculum Changes

During Japanese Colonial Period, all curricula were arranged according to the preferences of the national policy, industry and civil necessity. With the outbreak of Sino-Japanese War and WWII, various subjects were added, curriculums taught were tuned towards practicality, and even study terms have been reduced to cope with the military industry and mobilization. After WWII and during the KMT government takeover, the curriculum has changed dramatically due to different educational system and policies. The Ministry of Education announced in 1948 the standard curriculum of general education for college, and 142 credit hours required for graduation as criterion. This was revised in the years 1958, 1965, 1972, 1977, and 1983. Among which the curriculum was drastically modified in 1965 to match international educational and academic trend.

1971 年國立成功大學礦冶及材料學系高壓靜電選礦機(成大 概況)

High voltage electrostatic concentrator, Department of Mining & Metallurgy, NCKU, 1971

設立工程類研究所

1947年臺大率先成立電機工程研究所, 但未招生。成大於1957年成立機械工程研 究所並招生,為該校第一個研究所,亦為我 國首創。兩年後成立電機及土木兩工程研究 所;化學工程研究所則至1962年才開始招 生。由於碩士班辦學績效良好,電機工程研 究所於1968年開始招收博士生;其後,化工 於次年、土木及機械兩工程所於1971年設置 博士班。

臺大則於1960年及1964年分別設立土木 與化工碩士班;1964年電機所碩士班開始 招生;1966年成立機械所並招收碩士生。 清大於1956年在臺復校,8月先成立原子科 學研究所,9月招考首屆碩士生,先假臺大 上課,次年,首批校舍完工,秋季回新竹上 課。1970年原子科學研究所核工組改設為原 子核工程研究所。



1971年成大配合國家經濟建設及發展基本科學新增學系 Official document for establishing new departments in NCKU in coherence to national economic development policies

Establishing Graduate Schools of Engineering

National Taiwan University was the first to establish the graduate program for Electrical Engineering in 1947, but did not recruit any student. National Cheng Kung University founded the graduate program for Mechanical Engineering in 1957. It was the first graduate program of the university, and the first of such graduate program nationwide. Graduate programs for Electrical Engineering and Civil Engineering were founded two years later. Chemical Engineering started recruiting graduate students in 1962. Due to positive results in master's program, Electrical Engineering started recruiting PhD students in 1968, and Chemical Engineering followed the next year. PhD programs were both established for Civil Engineering and Mechanical Engineering in 1971.

National Taiwan University started its master's program for Civil Engineering in 1960, and Chemical Engineering in 1964. Electrical Engineering started recruiting master's student in 1964, while Mechanical Engineering started in 1966. National Tsinghua University was re-established in Taiwan in 1956, starting with the Nuclear Science program in August. The first master's students enter the program in September and had to study in National Taiwan University first. After the first campus buildings were constructed the next year, students were able to return to Hsinchu in the fall semester. The Institute of Nuclear Science was reformed as the Institute of Nuclear Engineering in 1970.

1963 年省立成功大學電機工程學系室外實驗 (52 級成大畢紀) Experiment in the Courtyard, Department of Eletronic engineering, PCKU, 1963



1966 年省立成功大學礦冶系 選礦機 Electrostatic concentrator, Department of Mining & Metallurgy, PCKU, 1966

邀請國際學人客座

臺大和成大兩校設研 究所初期,採用美國大學 體制,師資卻不足,幸有 行政院國科會前身「長期 科學發展委員會」補助各 校邀請國際學人來臺客 座、開辦短期研習會,彌 補缺陷;並鼓勵各大學在 職教師赴國外進修,數年 後各校師資顯著改善。

International Visiting Professors

Despite the graduate schools of both National Taiwan University and National Cheng Kung University have adopted the system of American colleges, the effort was hindered by the lack of proficient faculty. Fortunately, the Council of Longterm Science Development (predecessor of the National Science Council) under the Executive Yuan has filled the vacancies by inviting foreign professors from overseas, and hosting short-term workshops. The council has also encouraged the faculty members of local universities to advance their studies abroad, which has significantly improved the faculty groups of both universities' years later.



成功大學電機工程學系半導體實驗室(1971年成大概況) Semiconductor Laboratory, Department of Eletronic Engineering, NCKU

電子計算機啟用及個人電腦普遍化的效應

1964年IBM推出積體電路IBM360型電腦,使用作業系統,發展出 BASIC、RPG等高階語言,始被大學與大公司廣泛採用。行政院國科會於1965 年7月,分別在成大設置工程科學等五個研究中心。隔年由國科會補助購置電 子計算機,對各大學之教學及研究助益極大。1970年代各大學陸續成立「電 子計算機中心」。

1971年桌上型個人電腦開始大量生產,除了可在辦公室或房間使用而不必 到電子計算機中心(室)外,隨後學術網路興起後,搜尋、閱讀、收集資料及 通訊更加方便。



The Introduction of Computer and the Popularization of PC

In 1964, IBM announced the first mainframe computer system family, the IBM System/360. The application of operating system developed a series of high-level programming languages such as BASIC, RPG etc. that was widely adopted by colleges and companies. On July, 1965, the National Science Council founded five research centers, including Engineering Science, in National Cheng Kung University. During the following year, the NSC further designated funding for purchasing computers which created a huge impact on the teaching and research of the universities. By the 1970s, universities were then capable of establishing "Computing Centers" on their campuses.

In 1971, the start of mass production for desktop PCs has enabled the accessibility of computers within one's office or rooms without having to visit the computing center. With the emergence and growth of the academic network, the convenience of research and communication has been further optimized.

1972 年省立成功大學自製首枚火箭發射前準備(62級成大畢紀) Rocket test firing preparation, PCKU, 1972



蓬勃發展期(1973~1979)

Vigorous Development Period (1973~1979)

1973年11月行政院長蔣經國於國民黨第十屆四 中全會的行政工作報告中提出:將在五年內完成九 項大工程建設,包括南北高速公路、臺中新港、北 迴鐵路、蘇澳港、化學工業、大鋼廠、大造船廠、 鐵路電氣化、桃園國際機場。數月後新加核能電 廠,統稱「十大建設」,是一系列國家級基礎建設 工程。其實上列建設部份已於1960年代後期啟動, 亟需相關人才投入。政府復於1979年推動十二項建 設,工程人才需求更加殷切,但是,對於教育經費 與其他政府支出則產生排擠效應。

November 1973, the premier of Executive Yuan then, Chiang Chin-kuo, announced in the administrative work report of Kuomintang's 4th Plenary Session of the 10th Central Committee, that nine national construction projects were to be completed in five years: National Highway No. 1, New Port of Taichung, North Link Line railway, Port of Su-ao, Oil Refinery Industry, China Steel Factory, China Shipbuilding Corporation, Electrification of Western Line railway, and Taoyuan International Airport. Nuclear Power Plant was added to the list several months later. The construction of the entire series of national infrastructure was called the "Ten Major Construction Projects", which a part of the construction was in fact started during the late 1960s, and opened vast amount of opportunities for people with related technical know-hows and skills. Succeded from such legacy, the "Twelve Construction Projects" was pushed by the national government in 1979, and the need for engineering personnel became ever more present. However, these industrial development projects has marginalized education fundings as well as other national expenditures.



1972 年成大研發火箭試射 成功新聞剪報及照片(左 圖)

Press release and photograph in celebrating the successful test firing of rocket buit by Provincial Cheng Kung University



1973 年國立成功大學自製之凌空一號 (62 級成大畢紀) Ling-Kong Mk. I buit by students of NCKU (1973 Yearbook)



工業技術學院與科技大學的增設 (1974 ~ 1990)

為發展高級技職教育,並建構工業職業學校→工業專科學校→工業技術學院一貫之工業 技職教育,於1974年新設國立臺灣工業技術學院,隨後增設國立雲林技術學院,將國立臺北 工專改制升格為國立臺北技術學院,增設國立 高雄技術學院。1991年開放興辦私人技術學 院,朝陽技術學院於1994年開始招生,此後技 術學院數量遽增。不久,政府又放寬改制科技 大學,因此技術學院與科大大幅增加。

Increasing Institutes and Universities of Technology (1974-1990)

In order to develop higher vocational education, and to build a 3-tier system specialized for higher industrial vocational education in which its highest tier is in equivelant to technical colleges (and were called "Institute of Technology"), the National Taiwan Institute of Technology was founded in 1974, followed by the establishment of National Yunlin Institute of Technology, the upgrade of National Taiwan Provincial Taipei Institute of Technology (from junior college to college), and the establishment of National Kaohsiung Institute of Technology. In 1991, private institutes of technology were allowed to set up. Chaoyang Institute of Technology began its recruitment for students in 1994, and the overall number of "institutes of technology" has skyrocketed. The restrictions were later become more lenient for institutes of technology to further upgrade into "universities of technology", which has further increased the number of such schools.

大學法修訂與課程變革

1970年代以來臺灣的民主化歷 程促使大學自治得以落實於大學法 中。 1972年修正大學法取消「學 院共同必修制」,將學生規範於各 學系內,學習專門精深之專業知 識。至1978年始有「輔系」之規 定,1986年設置「雙主修」的規 定。此外,因生活改善更重視污染 防治,1976年在成功大學和中興 大學增設環工系;1980年代起, 也在各校化工系開授與污染防治相 關課程。隨後,生化、生物、半導 體、光電、柰米、新能源等新科技 相繼問世,為因應新科技時代,開 授新選修科目、訂定新學程,研究 方向也大幅改變。

Amending University Act and Changing Curriculum

Democratic progress in Taiwan since 1970s enabled university autonomy to be realized in the university act. The 1972 amendment of university act rescinded "schoolwide general education courses", relinguished the regulation of students to each department, in pursue of advance specialty. Regulations about "minor degree" was set up in 1978, and regulations about "double major" in 1986. With live improvement, the attention was drawn towards the prevention of pollution, which the Department of Envionmental Engineering was established in both National Cheng Kung University and National Chong Hsing University. Chemical engineering departments in various universities started to offer related courses from the 1980s. As new technologies such as: biochemistry, biotech, semiconductor, optoelectronic and photonics, nanotechnology, and new energy sources derived, new courses, curricula, and new headings for researches were set accordingly.



1975 年國立成功大學機械工程學系參訪(64 級成大畢紀) Field trip, Department of Mechanical Engineering, NCKU (1975 Yearbook)

發明及展覽風氣崛起

1974年臺大、臺北工專、 師大、淡江四校聯合舉辦發明 展;1976年5月第二屆全國大專設 計展;1979年3月有12所學校參加 在清大舉行第二屆全國大專科技 展…等等。展覽會吸引工商界發 掘學生研發與設計才能,並藉此提 供校際間彼此觀摩學習的機會。其 後,教育部、甚至電視台都舉辦發 明獎。

Invention and Exhibitions

In 1974, there was a joint exhibition of inventions by National Taiwan University, Taiwan Provincial Taipei Institute of Technology, National Taiwan Normal University, and Tamkang University; there was the 2nd national college design exhibition in May, 1976; and the 2nd national technological exhibition held in National Tsing Hua Univertity, which 12 colleges attended in March, 1979, etc. Exhibitions drew the attention of the industry towards the research, development, and design abilities of the students. They also provided opportunities for colleges to observe and learn from interaction. From then on, invention contests were held by the Ministry of Education, and even by TV stations.



1975 年國立成功大學水利工程學系實驗(成大畢紀) Field experiment, Department of Hydraulic Engineering, NCKU, 1975



1973 年國立成功大學土木工程學研究所航測儀(成大畢紀) Aerial survey instrument, Department of Civil Engineering, NCKU, 1973

國防科技與新興科技(1979~1990)

Defense Technology and Emerging Technology

建立國防體系

受到中共1964年10月原子彈試爆的影響,臺灣從1960年代起就有發展自主 國防的構想。除啟動原子武器研究外,從1969年起的20年間,在發展自主國 防政策下,推動相關產業發展與人才計畫。1971年退出聯合國,與許多國家 斷交,1973年起的二次石油危機,1978年底與美國斷交,促使蔣經國決定發 展自主國防,不再那麼依賴美國。1979年行政院頒布「科學技術發展方案」 ,催生科技顧問室、發展新興科技的科學園區、加強重工業,並強化大學相關 科系的實驗能力,促成國防與新興科技的發展。

Establishing Defense System

The impact of the Chinese Communist's nuclear bomb testing in October, 1964, has stimulated Taiwan's aspiration to develop an autonomous national defense system since the 1960s. Aside from nuclear weapons research, the autonomous defense policy had pressed for the program to foster specialized workers in related industry for two decades starting in 1969. During the same period, Taiwan has severed various diplomatic relations after its withdrawal from the UN in1971, endured the 1973 Oil Crisis, and severed diplomatic relation with the US in 1978. Thru the series of events, late President Chiang Ching-kuo has decided to develop autonomous national defense, instead of relying on the US. The Executive Yuan announced the "Science and Technology Development Plan" in 1979 to press for the birth of Science and Technology Advisors Office, which pushed the designation of science parks focusing on emerging technologies, and to strengthen heavy industry. Meanwhile, the experiment capabilities of the related departments in universities have also been enhanced. All of which has helped the progress in building a national defense system and for the development of emerging technology.


軍工學合作體系的形成

具體作為包括:

- · 航空: 強化原有航發中心、發展新式戰鬥機;
- 船舶:合併原有臺船與新設的中船兩公司,由臺灣機械公司自製大型船用主機,以搭配造船;
- · 汽車;由臺灣機械公司投資華同重車廠;
- 武器;由中山科學研究院發展各式飛彈與先進的電子作戰、導航系統。

為了建立系列國防工業體系,政府不僅大力補助上游的學術發展、中間的研發,還在下游的製造廠著手,意欲形成軍工學合作的體系。例如 1970年代設立的中鋼、臺機與中船三家公司時,就刻意一起設置於高雄 小港臨海工業區中鋼路兩側的國營重工業區。

Formulation of Integrated Military, Industry, and Academic System

Active strategies included:

- Aviation: enhance Aero Industry Development Center, and develop new fighter jets.
- Marine: merging the original Taiwan Ship Building Corporation with the newly formed China Ship Building Corporation, to build ships with vast ship engines constructed by Taiwan Machinery Corporation.
- Automobiles: invest in Huatung Motors, Ltd through Taiwan Machinery Corporation.
- Weaponry: Chung-Shan Institute of Science and Technology developed missiles, advance electric warfare, and navigation systems.

To establish a set of defense industry, and to formulate an integrated military, industry and academic system, the government heavily supported the initial academic studies, the mid-range researches and developments, and the manufacturers downstream. For example, China Steel Corporation, Taiwan Machinery Corporation, and China Ship Building Corporation, three nationalized heavy industries constructed, those were deliberately located in 1970s on the same road in Siaogang waterfront industrial area, Kaohsiung.

成大歸仁校區 100 式超級軍刀機(陳政宏攝) F-100 Super Sabre in Guiren Campus, NCKU (Photo: Jeng-Horng Chen)

大學院校相關科系的成立

教育方面,除基隆海洋學院造船系外,1970年成大設立 造船工程系,臺大於1971年先成立船模實驗室,1975年再 成立造船工程系,並設有超過許多一流大學的設備。1979 年1月,行政院成立國防工業發展政策指導小組,再交由 財團法人國防工業發展基金執行規劃項目。1980年代,成 大航太所及航太試驗場成立,臺大應力所、清大自強科學 中心(包括加強材料研究)、交大電子及資訊中心陸續成 立。

約略同一時期,中國工程師學會開始替國內主要大學辦 理暑期實習。來自臺大、成大、清大、交大、淡江、中原 各校的工程科系學生,被分發到各國營事業及較具規模的 民營公司。

Establishment of Related Departments in College

In terms of education, Department of Naval Architecture in the Provincial Taiwan Maritime College (Keelung), National Cheng Kung University established Department of Naval Architecture in 1970, National Taiwan University first set up the Ship Model Basin in 1971, and then the Department of Naval Architecture in1975 with equipments exceeding first rate colleges. Executive Yuan formed the National Defense Industry Development Steering Group in January 1979, and handed over to National Defense Industry Development Fund to execute. In 1980s, Institute of Aeronautics and Astronautics was established in National Cheng Kung University. Institute of Applied Mechanics in National Taiwan University, Tze Chiang Science Center (including enhanced material research) from National Tsing Hua University, and Semiconductor Instrument Center in National Chio Tung University followed thereafter.

At about the same period, Chinese Institute of Engineers started the summer training sessions for major colleges nationwide. Engineering students from National Taiwan University, National Cheng Kung University, National Tsing Hua University, National Chio Tung University, Tamkang University, and Chung Yuan Christian University

1990 之後調整期

Later Adjustment Period (1990 ~)

工程領域院系所擴增歷程

1960年代政府受限於財力,僅於 1961年在中興大學新設工學院土木 工程學系,並同意設置私立大學校 院,1955年有東海與中原兩校的創 設。復於1970年前後設立四所私立 大學校院,此為第一波擴增期(1955 ~1975)。

其後近十餘年無新學系設立,公 立大學延續在原有系所增設碩、博士 班。直至1989年遠東企業捐建元智工 學院,1990年燁聯集團捐設高雄工學 院(今義守大學)。1993年長庚醫學院 擴大為長庚醫學暨工程學院。此為第 二波擴增期(1975~2006)。

Expansion of Engineering Schools

Limited by government finance in 1960s, only the Department of Civil Engineering was set up in National Chung Hsing University in 1961. Private universities were allowed to be established, and thus Tunghai University and Chung Yuan Christian University were founded in 1955. Four more private universities were established around 1970 as the first wave of expansion (1955~1975)

There were no new departments founded in the following ten years or so, except for the extension of graduate programs in the original national universities. It was not until 1989 that Yuan Ze College of Engineering was established with the donation of the Far Eastern Group. E United Group funded the Kaohsiung Polytechnic Institute (currently I-Shou University) in 1990. Chang Gung Medical College expended into Chang Gung College of Medicine and Technology in 1993, and thus concluded the second wave of expansion (1975~2006).

學術網路的衝擊

為展開網路服務,各校電子計算機中心於1980年後期開始建置第一代骨幹 網路,各系所也開始建置其內部網路。教育部為支援全國各級學校及研究機 構之教學研究活動,並促進資源分享與合作,於1990年7月起,與幾個主要國 立大學共同建立一個全國性教學研究網路。透過此一學術網路,可以很方便 地搜尋、閱讀、收集許多資料以及通訊,對師生的教學、研究及學習裨益甚 大。1990年後期起,各校為了因應校園網路流量快速成長之需求,骨幹設備 全面更新,並陸續將「電子計算機中心」更名為「計算機與網路中心」。

Impact of Academic Network

To further deploy network service, computer centers of various universities started the construction of the first generation TANet in the late 1980s, including the network within each department. The Ministry of Education had advanced the pooling of resources and cooperation among colleges and research institutes, to support academic and research activities nationwide. Starting from July, 1990, major national universities have co-established a national teaching and research network. Through this academic network, it is easy to search, read, collect data and communicate. This is a great help to the teaching and research among faculties and students. In response to the fast-increasing network traffic on campus after late 1990s, the facilities of TANet were totally overhauled, and the "computing centers" renamed "computer and network centers".

畢業生就業及對國家社會的貢獻

Employment and Social Contribution of the Graduates

敬業、苦幹、踏實的精神

戰前培養的工業技術人才,在戰後初期接替日籍人員及投入重建工程,如 橋樑道路、都市建設等重大公共工程以及台電發電與輸電、中油煉油、台肥 各廠的復建等;也成為接收日資私人公司的人力來源。其後因政府擴辦學校 及不復受台/日人名額之限制,得以培育大量技術人才,為後續經濟發展提供 所需的人力。1970年代的重化工業、1980年代的科技業、1990年代高創新力 產業,都倚賴這些工業與工程相關院校培育的人才,他們多數敬業、苦幹、踏 實、上進的精神,深受實業界的歡迎與器重,在後期工業技術與研究上的輝煌 成就,是推動臺灣經濟起飛的重要角色。

Spirit of Dedication, Endeavor, and Pragmatic

The industrial technological specialists fostered before WWII replaced the Japanese personnel during the early post-War period. They devoted themselves to the reconstruction of major public structures, such as: bridges, roads, cities, Taipower electric grid, CPC refinery, and Taiwan Fertilizer Co. factories. They also became important human resource to take over Japanese private companies. With the expansion of schools and Taiwanese/Japanese ratio restriction lifted after the War, a great deal of the technical specialized personnel was able to sustain the need for the following economic development. It was the chemical and heavy industry in the 1970s, the technology industry in the 1980s, and the high innovative industry in the 1990s, that relied on the support of these talents from the cradle of industrial and engineering colleges. The spirit of dedication, endeavor, and pragmatic among these people are well appreciated by the entire industry. Their glorious achievements in the industrial technology and research are the key factor in advancing Taiwan's economic take off.

展場開幕照片

Exhibition Opening Day



翁鴻山前代理校長向馬哲儒、翁政義兩位前校長導覽展廳 Guided exhibition tour by Former Acting President Hung-Shan Weng to Former Presidents Zhe-Ru Ma and Cheng-Yi Weng

























展出文物

Exhibited Artifacts

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	計算尺 Calculating Ruler	成大博物館 NCKU Museum
	曲線尺 Curve Ruler	成大博物館 NCKU Museum
	王秀蓮老師筆記 Notebook	成大博物館 NCKU Museum
BEHERE Provide	成大造船工程學報 創刊號(民 62) Journal of Naval Engineering, NCKU (first issue)	成功大學總圖書館 Main Library, NCKU
	塑膠混合器 Plastic Mixer	成大化工系 Dept. of Chemical Engineering, NCKU
	可塑性測定器 Plasticity measurement device	成大化工系 Dept. of Chemical Engineering, NCKU
	壓力表 Pressure gauge	成大化工系 Dept. of Chemical Engineering, NCKU
	恆溫器 Thermostat	成大化工系 Dept. of Chemical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	十進位電阻箱 Decade resistor	成大化工系 Dept. of Chemical Engineering, NCKU
	感應線圈 Induction coil	成大化工系 Dept. of Chemical Engineering, NCKU
in in the	衰落電阻器 Decadent rheostat	成大化工系 Dept. of Chemical Engineering, NCKU
A CORPORT OF A	電位計 Potentiometer	成大化工系 Dept. of Chemical Engineering, NCKU
CROCK STATE	毛管電位計 Capillary potentiometer	成大化工系 Dept. of Chemical Engineering, NCKU
	流量計 Flowmeter	成大化工系 Dept. of Chemical Engineering, NCKU
	風速計 Anemometer	成大化工系 Dept. of Chemical Engineering, NCKU
	流量計 Flowmeter	成大化工系 Dept. of Chemical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	金屬管件切割器 Metal pipe cutter	成大化工系 Dept. of Chemical Engineering, NCKU
	血細胞計數板 Haemocytometer	成大化工系 Dept. of Chemical Engineering, NCKU
	蔗糖計 Saccharometer	成大化工系 Dept. of Chemical Engineering, NCKU
	比重計 Hydrometer	成大化工系 Dept. of Chemical Engineering, NCKU
	比重計 Hydrometer	成大化工系 Dept. of Chemical Engineering, NCKU
	玻璃製品 Glassware	成大化工系 Dept. of Chemical Engineering, NCKU
	電動天平 Electronic balance	成大化工系 Dept. of Chemical Engineering, NCKU
	製圖用圓規鴨嘴筆 Duckbill pen for drawing	成大化工系 Dept. of Chemical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	繪圖工具 Drawing tools	成大化工系 Dept. of Chemical Engineering, NCKU
	繪圖工具 Drawing tools	成大化工系 Dept. of Chemical Engineering, NCKU
	離心機 Centrifuge	成大化工系 Dept. of Chemical Engineering, NCKU
F-69	KBR die(IR 壓片用) KBr Pellet Die	成大化工系 Dept. of Chemical Engineering, NCKU
	檢流計 Galvanometer	成大化工系 Dept. of Chemical Engineering, NCKU
B775-51 B13-1	標準鎘(カドミフム)電池 Standard cadmium Battery	成大化工系 Dept. of Chemical Engineering, NCKU
	D2 型 A 級檢流計 D-type A-wave galvanometer	成大化工系 Dept. of Chemical Engineering, NCKU
	pH 值檢測器 pH meter	成大化工系 Dept. of Chemical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	磁性加熱攪拌器 Hot plate / magnetic stirrer	成大化工系 Dept. of Chemical Engineering, NCKU
	吹玻璃用本生燈 Bunsen burner (for Glassblowing)	成大化工系 Dept. of Chemical Engineering, NCKU
	針筆 Technical drawing pen	成大化工系 Dept. of Chemical Engineering, NCKU
	數字式曲折計 Digital refractometer	成大化工系 Dept. of Chemical Engineering, NCKU
	屈折計 Refractometer	成大化工系 Dept. of Chemical Engineering, NCKU
	電流電壓計 Current voltmeter	成大化工系 Dept. of Chemical Engineering, NCKU
	天平 Balance	成大化工系 Dept. of Chemical Engineering, NCKU
	天平砝碼 Counterpoise	成大化工系 Dept. of Chemical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	計算尺 Slide ruler	成大化工系 Dept. of Chemical Engineering, NCKU
	壓片機 Tabletting machine	成大化工系 Dept. of Chemical Engineering, NCKU
MOL ECULAR HODELS	分子模型 Molecular models	成大化工系 Dept. of Chemical Engineering, NCKU
	繪圖儀器 Drawing tool	成大化工系 Dept. of Chemical Engineering, NCKU
	比重計 Hydrometer	成大化工系 Dept. of Chemical Engineering, NCKU
	比重計 Hydrometer	成大化工系 Dept. of Chemical Engineering, NCKU
	比重計 Hydrometer	成大化工系 Dept. of Chemical Engineering, NCKU
	曲線尺 Curve ruler	成大化工系 Dept. of Chemical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	繪圖儀器 Drawing tool	成大化工系 Dept. of Chemical Engineering, NCKU
A H A H A H A H A H A H A H A H A H A H	賴再得 - 畢業證書 Tainan Higher Technical School Diploma of Zai-De Lai	成大化工系 Dept. of Chemical Engineering, NCKU
A to the to the total and the total and total	碩士論文(葉和明) Graduates thesis by He-Ming Yeh	成大化工系 Dept. of Chemical Engineering, NCKU
王 與 錄 舉	工具機學下卷 Machine Tool Volume 2	成大機械系 Dept. of Mechanical Engineering, NCKU
楼 拍 學	機構學上冊 Mechanism Volume 1	成大機械系 Dept. of Mechanical Engineering, NCKU
工程力學	工程力學 Engineering Mechanics	成大機械系 Dept. of Mechanical Engineering, NCKU
工 具 機	工具機(上)(下) Machine Tool Volume 1, 2	成大機械系 Dept. of Mechanical Engineering, NCKU
- <u>王</u> 其根學大綱 	工具機學大綱上卷 Machine Tool Volume 1	成大機械系 Dept. of Mechanical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
被 核 製 造	機械製造 (上)(下) Manufacturing Processes Volume 1, 2	成大機械系 Dept. of Mechanical Engineering, NCKU
12 (A) (2 (12 /7 14 -	應用流體力學 Applied Fluid Mechanics	成大機械系 Dept. of Mechanical Engineering, NCKU
	圖學 (1) 投影幾何 Descriptive Geometry	成大機械系 Dept. of Mechanical Engineering, NCKU
	槽塊 Grooved block	成大機械系 Dept. of Mechanical Engineering, NCKU
	測微器(內) Micrometer (Inner)	成大機械系 Dept. of Mechanical Engineering, NCKU
W	厚度規 Thickness gauge	成大機械系 Dept. of Mechanical Engineering, NCKU
	車床常用工具組 Regular lathe equipment package	成大機械系 Dept. of Mechanical Engineering, NCKU
AMES CONTRACTOR	測微計度盤規 Micrometer dial indicator D-8793	成大機械系 Dept. of Mechanical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	藍曬圖 Blueprint	成大機械系 Dept. of Mechanical Engineering, NCKU
	玻璃投影片 Glass negatives	成大機械系 Dept. of Mechanical Engineering, NCKU
A de a Altre Lane A de a Altre Lane Altre Lane Altre Lane Altre Lane	機械系首屆碩士班畢業論文 - 葉欽伯 The First graduates Thesis (001)	成大機械系 Dept. of Mechanical Engineering, NCKU
	物理系刊創刊號 Journal of Physics (Initial Issue)	成大機械系 Dept. of Mechanical Engineering, NCKU
	機械工程創刊號 Mechanical Engineering (Initial Issue)	成大機械系 Dept. of Mechanical Engineering, NCKU
	物理學刊第一期 Journal of Physics (Initial Issue)	成大機械系 Dept. of Mechanical Engineering, NCKU
	成大機械第七期 Mechanical Engineering, NCKU (7th Issue)	成大機械系 Dept. of Mechanical Engineering, NCKU
BE AND A SECOND	機械系 69 班刊 Class journal of M.E.	成大機械系 Dept. of Mechanical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
警生成错忆或薄 2010年1月7-2日月日 将任教师张柔慧五王 6.5.6.2工参校及共成型	學生成績計分簿 (臺灣省立工學院) Scoring Book (Taiwan Provincial College of Engineering)	成大機械系 Dept. of Mechanical Engineering, NCKU
HE & TO & MARINE TO A	碩士論文 (夏漢民) Graduates thesis by Han-Min Hsia	成大機械系 Dept. of Mechanical Engineering, NCKU
	熱力學 Thermodynamics	成大機械系 Dept. of Mechanical Engineering, NCKU
· 前四致旋杆学	前田教授材料學 Material Science (Professor Maeda)	成大機械系 Dept. of Mechanical Engineering, NCKU
	蒸氣機教學模型 Steam engine model	成大機械系 Dept. of Mechanical Engineering, NCKU
	平面皮帶傳動模型 Continuous belt model	成大機械系 Dept. of Mechanical Engineering, NCKU
	學生工廠實習成品 Manufactured product from student factory internship	成大機械系 Dept. of Mechanical Engineering, NCKU
	木模(翻砂鑄造) Wooden mold (foundry casting)	成大機械系 Dept. of Mechanical Engineering, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
CO24 Control Control C	深度規 Micrometer depth gauge	成大機械系 Dept. of Mechanical Engineering, NCKU
	測微器(內) Micrometer (Inner)	成大機械系 Dept. of Mechanical Engineering, NCKU
	夾板 Clamp	成大機械系 Dept. of Mechanical Engineering, NCKU
O	惠斯頓電橋 Wheatstone Bridge	成大物理系 Dept. of Physics, NCKU
T-Trente Bigiold?	低電阻箱 Low resistance box	成大物理系 Dept. of Physics, NCKU
B3+15	精密吸電位差計 Potentiometer	成大物理系 Dept. of Physics, NCKU
5 B 4 - 3 1 4	精密電阻器 Precision resistor	成大物理系 Dept. of Physics, NCKU
U 2009-007-0005	比重計 Hydrometer	成大物理系 Dept. of Physics, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	檢流計測試器 Galvanometer	成大物理系 Dept. of Physics, NCKU
	比重天平 Specific gravity balance	成大物理系 Dept. of Physics, NCKU
H 2002 88	電阻箱 Resistance box	成大物理系 Dept. of Physics, NCKU
Land Contraction	惠斯頓電橋 Wheatstone bridge	成大物理系 Dept. of Physics, NCKU
	反射電流計 Reflection galvanometer	成大物理系 Dept. of Physics, NCKU
	rapid pH meter(ion) pH 值 測量器 rapid pH meter(ion) pH meter	成大物理系 Dept. of Physics, NCKU
	電壓計 Voltmeter	成大物理系 Dept. of Physics, NCKU
	電流計 Ammeter	成大物理系 Dept. of Physics, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	U 型壓力計 U-tube manometer	成大物理系 Dept. of Physics, NCKU
OT-	軟木塞調整機 Cork adjuster	成大物理系 Dept. of Physics, NCKU
	等臂天平 Equal-arm balance	成大物理系 Dept. of Physics, NCKU
ER	渦電流發生器 Eddy current generator	成大物理系 Dept. of Physics, NCKU
Į.	厚度檢測計 Thickness gauge	成大物理系 Dept. of Physics, NCKU
	教學儀器 Teaching equipment	成大物理系 Dept. of Physics, NCKU
	微電流計 Micro current meter	成大物理系 Dept. of Physics, NCKU
	靜電產生器 Electrostatic generator	成大物理系 Dept. of Physics, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
U-2009-007-0083	桌上型檢流計 Galvanometer	成大物理系 Dept. of Physics, NCKU
	三臂天平 Triple beam balance	成大物理系 Dept. of Physics, NCKU
	電壓電流計 Voltage current meter	成大物理系 Dept. of Physics, NCKU
	正切檢流計 Tangent Galvanometer	成大物理系 Dept. of Physics, NCKU
	顯微鏡 Microscope	成大物理系 Dept. of Physics, NCKU
	微電流計 Micro current meter	成大物理系 Dept. of Physics, NCKU
	電容器 Capacitor	成大物理系 Dept. of Physics, NCKU
Rest Contraction	惠斯頓電橋 Wheatstone Bridge	成大物理系 Dept. of Physics, NCKU

圖片 Picture	名稱 Name	典藏單位 Agency of Collection
	音叉 Tuning fork	成大物理系 Dept. of Physics, NCKU
A.	旋轉慣量儀 Rotational inertia apparatus	成大物理系 Dept. of Physics, NCKU
	正切檢流計 Tangent galvanometer	成大物理系 Dept. of Physics, NCKU
	水銀溫度計 Mercury thermometer	成大物理系 Dept. of Physics, NCKU
	單擺 Cenco-blackwood ballistic pendulum	成大物理系 Dept. of Physics, NCKU
- A	等臂天平 Equal-arm balance	成大物理系 Dept. of Physics, NCKU
	直流 - 交流電流表 D.C-A.C projection meter	成大物理系 Dept. of Physics, NCKU
紡織學刊	紡織學刊(後改名纖維工程) 第1期(民 56) Journal of Textiles (Initial Issue)	臺北科技大學 National Taipei University of Technology

圖片	名稱	典藏單位
Picture	Name	Agency of Collection
Partie	劉鼎嶽帝大畢業證書圖檔 Taipei Imperial University Diploma	臺灣大學 National Taiwan University

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陳政宏、顧盼、郭美芳:《鐘聲密碼》,文化部文化資產局,2013年。

楊麗祝、鄭麗玲:《百年風華 - 北科校史》,國立臺北科技大學,2008年

郭美芳等:《篳路藍縷-臺灣省立工學院院史展特刊》,國立成功大學博物館,2010年。 翁鴻山:《臺灣工業教育及工程教育發展歷程概要》(臺灣工程教育史第壹篇),預定 2020年底由成大研究發展基金會出版。

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鄭麗玲:《臺灣第一所工業學校》,新北市,稻鄉出版社,2012年。

教育部網頁。

各大學網頁;包括國立臺北科技大學、國立臺灣大學、國立清華大學、國立交通大學、國 立中央大學、國立臺灣科技大學、國立雲林科技大學、國立高雄應用科技大學、明志科技 大學、大同大學、東海大學、中原大學、淡江大學、逢甲大學等。

維基百科。

國家圖書館出版品預行編目資料

世紀工程:工程教育與經濟建設的百年對話 (第一冊:工程教育簡史展彙編)
臺南市:成大,2022,12
面:公分
978-626-7227-04-6(平裝)

1. 工程教育史、2. 大學博物館、3. 展示

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