

國科會計畫

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奈米國家型人才培育計畫---奈米科技創新課程開發及推廣計畫(I)
Innovative Curriculum Design and Outreach of Nanoscience and Technology (I)

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中文摘要

本整合型計畫的目的在推動新興奈米科技融入課程，讓高中職至大學生能主動體驗動態尖端科技發展課程過程，瞭解科技對人類的影響，以誘發不同階段學生對科技的好奇心與興趣，培養探究式學習的習慣，培育未來基礎科技研發人才。彰化師大奈米科技中心為國家奈米核心設施設置計畫成員，多年來執行國科會奈米核心設施計畫，已建置多項奈米結構製程及檢測儀器，並執行教育部前瞻奈米人才培育及 K12 奈米科技種子教師培育計畫，串聯自小學、中學（K12）、大學生及大學教授，建構具跨領域、創造力之學習主體。本校近幾年在提升奈米科技研究水準、推廣奈米科技知識、服務各大專院校及培訓中小學奈米科技種子教師等方面，均有卓越成果。本計畫透過本校奈米科技中心專業人才組織一個奈米科技課程研究發展中心，結合逢甲大學、溪湖高中、竹南高中及遠哲基金會，協助高中職與大學教師合作，提升教師專業能力，進行新興科技知識融入數理課程的教學改進，在教學中將學科理論與當前的科學技術和科技發展及日常生活緊密聯繫起來，以促進數理學科的教學改革。並透過評估機制，修正改進教學的內涵。本計畫以科學教育為基礎，開發奈米科技課程在高中職及大學實施，並確保教學品質。藉由各前瞻奈米科技課程的規劃與開設，建立大學學生及職前師資的奈米學科專業素養。藉由專家學者參與指導，STS 教育新思維及探究式教學法，將奈米科學新知與技術發展彙整編撰成適當之教材融入高中職課程及「專題製作」課程，使高職課程能跟隨科技發展，並使學生所學能適應未來之生涯發展。並經由遠哲科學基金會之師資群進行規劃，推動奈米科技內涵融入寒暑假科學營，透過動手做之實驗操作，養成國中小學生對於奈米科技之正確觀念。優質的奈米科技課程，須建立各階段課程指標與有效評量工具的檢驗，是達成優質課程的依據與保證，培養主動探索動態奈米科技發展的國民，提昇科技教育的品質，是現今科技教育重要的一環。發展確保品質保證的各階段奈米科技課程與科普教育的實踐，以期培育出優秀的奈米科技人才，為奠定台灣在全球科技發展之優勢作出具體貢獻。

Abstract

The goal of this integrated program is to promote the integration of emerging nanotechnology into curriculum, so that high/vocational high school students can take the initiative to experience the development process of the state of the art technology, and know the impact of technology on human beings, thus induce the curiosity and interests of the students at different stages in science and technology, cultivate their habits of exploring, and nurture the future basic research and development personnel. Center for Nanotechnology National Nanotechnology in National Changhua Educational University is a member of National Nano-Science and Technology core facilities program, and has implemented the National Nano-Science and Technology core facilities program for many years. It has built up a number of nano-structure manufacturing and testing apparatus, and has implemented the foresight Nano-Science talents cultivation program and the K12 Nano-Science and Technology seed teachers cultivation program of the Ministry of Education. The elementary school students, secondary school students(K12), university students and university professors were combined to build a cross-field, creative learning subject. In recent years, our school has had successes in upgrading the level of nanotechnology research, promoting nanotechnology knowledge, serving various university level institutions and training Nano- Science and Technology seed teachers in elementary and secondary schools. Through the University Center for Nano-Science and Technology professionals, this program organizes a Nano-science and technology curriculum Research and Development Center. Combined with Feng Chia University, Tsi Hu High School, ChuNan high school and Yuan Zhe Foundation, we help high school and university level teachers to cooperate, upgrade the professional ability of the teachers, improve the curriculum by integrating new scientific and technology knowledge into the teaching of mathematics and science, and link the theory to the current science and technology development and daily life closely in teaching, in order to promote the reform of the teaching of mathematics and science subjects. The contents of the teaching are improved through the assessment mechanism. Based on science education, this project develop nano-science and technology curriculum in high school and university level and ensure quality teaching. By the foresight planning and establishment of the curriculum in nano-science and technology, it equip university students and pre-service teachers with professional knowledge of nanotechnology. With the guidance of experts and scholars, and with the STS new educational ideas and inquiry approach teaching, the development of new knowledge in nano-science and technology is integrated appropriately into the high school level curriculum materials and "fabrication topic" courses, so that the high school level curriculum can keep pace with technology development, and what the students learning can adapt to their future career development. And by the plan of teacher group in YuanZhe Foundation, through the hands to do experiments, the integration of scientific and technological contents of nano-science into the winter and summer vacation scientific camps will be promoted, so that the elementary and secondary level students will develop right concept of nano-science and technology. Quality nano-science and technology curriculum, with targets for various stages of curriculum and

effective evaluation instruments, is the basis and guarantee to achieve quality curriculum. Cultivating nationals, who has the initiatives to explore the development of nanotechnology, and improving the quality of science and technology education, are nowadays an important link in science and technology education. The development of quality ensured curriculum at all stages of nanotechnology and the practice of science education, with a view to nurture excellent talents in nanotechnology, will make a concrete contribution in laying global advantages of Taiwan in the scientific and technological development.