

# **A Cross-National Analysis of Undergraduate Curriculum Models: Focusing on Research-Intensive Universities**

**Research Institute for Higher Education**

**Hiroshima University**

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## Contents

Undergraduate Curriculum Issues in Australian Higher Education:

Looking back, Looking forward

*Kerri-Lee Krause* ..... 1

Undergraduate Curriculum Reforms in China

*Futao Huang* ..... 13

Undergraduate Education, General Education, and the Curriculum:

A Perspective from Japan

*Akira Arimoto* ..... 27

Higher Education in the UK: the Special Status of Physical Science

and Engineering

*Keith J. Morgan* ..... 43

Trends in American Undergraduate Higher Education

*Arthur K. Ellis* ..... 61

The Research Institute for Higher Education (RIHE), Hiroshima University, was established in May 1972 with the approval of the Ministry of Education as the first national institution for research in higher education. With its commitment to academic research, RIHE has developed since then to make significant contributions to higher education research both inside Japan and overseas. It celebrated its thirtieth anniversary in 2002.

This anniversary coincided with a decision of the Japanese government to establish its policy of support for research excellence, the "21st Century Center of Excellence program". RIHE's project "Construction of a System for 21st Century Higher Education and Quality Assurance" was selected as one of 20 programs in the field of humanities and 113 programs in all disciplines. This formal recognition of RIHE as the sole COE in higher education identifies both its unique achievement and its capacity to contribute significantly to the future development of higher education. Its achievement reflects the dedication and commitment of many colleagues over the past three decades, transforming the status of research in higher education from a curiosity into the substantial position it now occupies. Those of us now working in RIHE are privileged to stand on the shoulders of the giants who established this reputation. They provide us with a continuing challenge to sustain their pioneering spirit.

The current COE program extends for five years in order to enable the project to develop fully. Specifically, the program will intensively address five aspects: institutionalization and assessment of the quality of faculty development and staff development; quality assurance in the academic research system; arrangements for and quality assessment of academic organization; construction of an international reference data base of academic systems; and training of younger researchers in higher education. In addition, in order to develop the international research network centered on RIHE we shall be publishing COE research publications in English as well as Japanese. The style of publication adopted in this volume reflects our intentions in this regard. Its aim is to place on record aspects of research already completed that are related to the COE program and to make it accessible internationally.

As the leader of the COE program project, this opportunity to provide useful information and new material to readers concerned with developments in higher education gives me particular pleasure. In turn, within RIHE, we shall be pleased to receive support, co-operation and comments from readers so that our work may be strengthened and that the function of the research network can be promoted.

March 2003

Akira Arimoto  
Professor, R.I.H.E., Hiroshima University  
COE Project Leader

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# Undergraduate Curriculum Issues in Australian Higher Education: Looking back, Looking forward

Kerri-Lee Krause\*

## Introduction: The National Context

Australian higher education is characterized by centralized federal government funding and policy-making at the national level, and relative institutional autonomy in terms of curriculum design, delivery and review. The sector comprises 37 public universities and three private universities. As in most other Organization for Economic Co-operation and Development (OECD) nations, these institutions are highly competitive in terms of marketing of degree programs and student recruitment both nationally and internationally.

Historically, the Australian undergraduate curriculum has been based on the British model of a basic three-year undergraduate degree with study focused in a particular discipline from the first year of enrolment. The undergraduate degree may be followed by an optional Honours year. Entry to the latter is based on academic achievement in the undergraduate years. Unlike the United States and Japan, Australian universities have not, as a rule, included a general education or liberal arts component in the undergraduate degree program. There are some exceptions to this in certain institutions or individual programs, as will be noted later; but the most ubiquitous model, until recently, has been that of the three year, disciplinary-focussed undergraduate degree program.

In recent years, however, there has been an upsurge in the proportion of undergraduate students opting to enroll in combined degree programs that most commonly involve enrolment across at least two discipline areas. In a recent national trend study of the first year experience, Krause and colleagues<sup>1</sup> noted that the proportion of first year students enrolled in double degree programs had increased from eight per cent of the sample in 1994, to one quarter of the sample a decade later. Examples of combined degree programs include Bachelor of Arts/Bachelor of Science, Bachelor of Engineering/Bachelor of Commerce, Bachelor of Information Systems/Bachelor of Business. Typically, these combined programs extend full-time student candidature by one to two years. Combined degree programs have proliferated primarily in response to student demand and many universities have encouraged this trend as a way of attracting students with promises that combined degree programs will:

“increase employment opportunities upon graduation. Students will study in a

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<sup>1</sup> Krause, K., Hartley, R., James, R., & McInnis, C. (2005). *The first year experience in Australian universities: Findings from a decade of national studies*. Canberra: Australian Department of Education, Science and Training (DEST).

combination of areas and will hold elevated professional skills and knowledge incomparison to graduates of a single degree program” (University of Southern Queensland, Faculty of Sciences).<sup>2</sup>

Despite the apparent popularity of combined degree programs as a means of making students more ‘employable’, concern has recently been expressed at the impact of these demand-driven programs on the quality of the student experience and student learning at university. Krause and colleagues<sup>3</sup> observed distinct differences in the experience of students in combined degree programs as compared with those following more traditional single degree pathways. Typically, those enrolled in combined degrees were less satisfied with their overall university experience and were more likely to express the view that university had not lived up to their expectations. One explanation for this may be that combined degree programs have proliferated at such a rate that limited attention has been given to the unique demands placed on students studying across disciplines, nor to the possibilities of cross-disciplinary curriculum transformation that supports the combination of diverse disciplinary cultures in a single learning experience. Administrative issues, too, have been a source of student complaint with some students noting that the different disciplinary units or departments fail to work together in a coherent way to support students studying across their respective disciplines.

These empirical student data provide a salutary reminder of the need for a more scholarly examination of the significant implications of recent and current changes in the Australian undergraduate curriculum. Limited attention has been given to tracking some of the key national and institution-level curriculum reforms and their implications for the quality of the student experience, pedagogy and student learning outcomes.

One of the few federally sponsored examinations of curriculum issues at the national level was a study by Rosenman.<sup>4</sup> A key aim of the Rosenman report was to examine ‘the perceived need to reconsider the purposes and outcomes of undergraduate education.’ Over the last fifteen years, the federal government has funded several discipline-specific studies that have included review of curriculum issues, particularly in professional degree programs such as nursing<sup>5</sup> and accounting.<sup>6</sup> Study has also been given to implications for curriculum of new approaches to learning and teaching, such as problem-based learning and its implications for the curricula of professional degree programs.<sup>7</sup> However, there has been no evidence of consideration given to sector-wide undergraduate curriculum issues across disciplines in Australian universities. Curriculum reform has tended to take

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<sup>2</sup> Source: <http://www.usq.edu.au/sciences/futuredomesticstud/comdeg.htm>.

<sup>3</sup> Ibid.

<sup>4</sup> Rosenman, L. (1996). *The broadening of university education: An analysis of restructuring curriculum change options*. Canberra: DEST.

<sup>5</sup> Aitken, R., Faulkner, R., Buchnall, T., & Parker, J. (2001). *Aspects of nursing education: The types of skills and knowledge required to meet the changing needs of the labour force involved in nursing: Literature review*. Canberra: DEST.

<sup>6</sup> Mathews, R., Jackson, M., & Brown, P. (1990). *Accounting in higher education: Report of the review of the accounting discipline in higher education*. Canberra: DEST.

<sup>7</sup> Aldred, S. E., Aldred, M. J., Walsh, L. J., & Dick, B. (1997). *Direct and indirect costs of implementing problem-based learning into traditional professional courses within universities*. Canberra: DEST.

place in local contexts and, specifically, within disciplines.

In the context of powerful national, international and market forces in higher education, the sector can no longer afford to consider curriculum reform as simply a discipline-based, local-level issue. Several influential factors have conspired together to force a renewed focus on the national significance of undergraduate curriculum issues in Australian higher education. In order to appreciate the significance of these developments and their implications for shaping the future of the undergraduate curriculum in Australian universities, a brief overview of current undergraduate curriculum structures is provided.

### **Overview of Australian Undergraduate Curriculum Models**

It is possible to identify certain defining characteristics of the Australian undergraduate curriculum which, in some cases, has remained largely unchanged in terms of structure for over a century in older institutions such as the University of Sydney and the University of Melbourne. The broad pattern of the undergraduate curriculum is relatively uniform across the sector, though selected examples of variations on the model are provided by way of illustration and to emphasise that ultimately, institutions have responsibility for designing their undergraduate curricula.

*Entry Requirements* Undergraduate students access higher education through multiple pathways. The most common entry point is that of students who successfully complete high school (Year 12) and gain entry to a specific degree program within a chosen institution. Selection is made on the basis of an entry score that is based on students' achievement in state-based matriculation examinations. For example in New South Wales, the Universities Admission Index (UAI) is a numerical measure of each student's overall academic achievement in the Higher School Certificate, while the Victorian Certificate of Education (VCE) yields an ENTER score which is used as the basis for entry into undergraduate programs. While each Australian state and territory has their own system for determining matriculating students' achievements, methods are in place for calculating equivalent interstate scores where necessary.

Potential international undergraduate students are expected to have successfully completed matriculation examinations or equivalent qualifications and to have met predetermined English language requirements. These may vary across institutions and disciplinary areas.

Other forms of undergraduate entry include those for mature students who may not meet standard entry requirements such as completion of matriculation examinations. Entry requirements for these students vary considerably and may include portfolio submission entry,<sup>8</sup> or consideration of a range of aptitude and personal characteristics.<sup>9</sup>

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<sup>8</sup> For an example of portfolio entry, visit Edith Cowan University: <http://ecugreatcareers.com/nonschool/mature.htm>.

<sup>9</sup> An example of a mature age entry scheme is in Law at Queensland University of Technology: <http://www.law.qut.edu.au/mature/entry/>. Another example is the Jubilee scheme at Macquarie University: <http://www.reg.mq.edu.au/Undergrad/admissions/prospectivestudents/alternatepathways/jubilee.htm>.



Several other entry pathways exist for students wishing to access undergraduate study in Australian universities, including articulation from the Technical and Further Education (TAFE) sector into higher education. Alternative forms of entry are also provided for students from educationally, financially or socially disadvantaged backgrounds. An example of a highly successful institutional scheme supporting alternative entry of this kind is ‘Access Melbourne’<sup>10</sup> at the University of Melbourne. This scheme combines a special entry and access scholarships programs.

*Discipline Focus and Decision-Making* One of the distinctive features of the current Australian undergraduate curriculum, as compared with that of the United States or Japan, is that students are expected to decide on their ‘major’ area of study upon enrolment in their first year.<sup>11</sup> Students enroll for study in a specific discipline area from the start of their undergraduate experience, and in this way they affiliate with an academic faculty, school or department, rather than enrolling in a liberal arts college for a general education component of study.

There are several consequences of this curriculum design feature. It means that school careers’ advisers are expected to play a significant advising role for students faced with the challenge of selecting the ‘right’ course during their final year of high school – many months prior to enrolment. Typically, Australian universities do not have the well-developed system of course advising to be found in most North American institutions of higher education. This means that a notable burden of responsibility rests with institutional websites, brochures and information sessions (e.g., university ‘Open Days’) to provide accurate, comprehensive and timely course advice.

Concern has been expressed in many quarters regarding the undue pressure placed on young students who are expected to commit themselves to disciplinary-focussed study from the first year. Some argue that these students are too young and may not be adequately prepared to make such choices so early in their university experience. This concern is justified to some extent, with one third of first year students in a recent national study agreeing that they did not feel ready to choose a university course on leaving secondary school.<sup>12</sup>

On the other hand, when asked whether or not they would have preferred starting with a general first year at university, before selecting a specific disciplinary area of study, the majority of first year students (75 per cent) sampled in 2004 said they would not like this option.<sup>13</sup> One reason for this view may be the perception that, by adding a ‘general’ component to the undergraduate degree program, the period of enrolment (and for many, the financial burden) may be extended.

<sup>10</sup> For more information see: <http://www.futurestudents.unimelb.edu.au/aust/aug/accessmelb/index.html>.

<sup>11</sup> An example of instructions provided to students about how to choose a major area of study can be found in relation to studying Economics at the University of Melbourne: <http://www.economics.unimelb.edu.au/students/study.htm>

<sup>12</sup> Krause, K., et al. (2005). *The first year experience in Australian universities: Findings from a decade of national studies*. Canberra: Australian DEST.

<sup>13</sup> Ibid.

*Undergraduate Curriculum Structures* The typical duration of the single degree full-time undergraduate program is three years – for bachelors degree programs such as Education, Arts, Science and Commerce – and four years for a Bachelor of Laws or a Bachelor of Engineering. In the case of a Bachelor of Medicine, undergraduate entry programs typically span a six year period, with Bachelor of Dental Science typically comprising five years. Similar to the United Kingdom undergraduate model, students may enroll in a Bachelor’s degree (pass) for three years and, depending on their academic record, they may be eligible to extend their full-time study by one year to enroll in a Bachelor’s degree (honours) for 4 years. The latter involves disciplinary specialization and has a distinctive research focus.

While the abovementioned models are typical, the sector has witnessed many significant changes and variations on the single degree model in recent years. These changes have emerged in response to student demand, as mentioned earlier, but also in response to employer and industry demands for so-called ‘T-graduates’; that is, graduates who have both breadth of knowledge and transferable or generic skills (represented by the horizontal bar in the letter ‘T’), and those who possess a depth of relevant disciplinary and professional knowledge (represented by the vertical dimension of the letter ‘T’).

Graduate entry programs have proliferated as a means of opening a market for students with an initial undergraduate degree to expand their professional knowledge and to become more employable without enrolling in a second full undergraduate degree program. An example of this is seen in the Graduate Entry Program at the University of Melbourne which provides opportunity for graduates of any discipline to enter medicine and to complete their degree program in 4.5 years (as compared to the six years of an undergraduate entry program). Graduate entry programs may be found across the disciplines in Australian universities, from Nursing to Education and Law. It is fair to say, however, that a significant proportion of such programs are to be found in the health and allied science areas such as Medicine, Physiotherapy and Dentistry.

As mentioned earlier, the proliferation of combined (or double) degree programs in Australian higher education has been one of the hallmarks of curriculum reform in Australia over the last decade, though this reform has received little scholarly attention in terms of analysis of its impact on the quality of pedagogy and student outcomes.

*The Role of General Education* The concept of general education as defined in the North American higher education context does not have a notable place in the undergraduate curriculum models of Australian universities. The Association of American Colleges and Universities defines general education as:

“The part of a liberal education curriculum shared by all students. It provides broad exposure to multiple disciplines and ways of knowing, and forms the basis for

developing important intellectual and civic capacities.”<sup>14</sup>

It is true that principles of general education are integrated into the curriculum of individual programs, such as Law at the University of Melbourne which includes eight subjects taken from other academic departments and disciplines with the objective of providing students with a broader education and general knowledge. Typically, institutions and departments make decisions about the extent to which students may take elective subjects outside their discipline. It is certainly not uniform practice, however, to incorporate general education subjects into undergraduate programs.

There are, nevertheless, some exceptions to this rule. The most notable of these is the University of New South Wales which has a well-established General Education program which aims to introduce first year (or freshman) students to a broad general education to complement their specialized disciplinary study. A minimum of 12 units of credit is required in General Education courses. These courses comprise a combination of courses designed especially for the General Education Program and a limited number of ‘mainstream’ subjects offered in the degree programs of certain departments.<sup>15</sup>

Other efforts to promote shared, cross-disciplinary experiences in the first year are represented in some universities’ introduction of a common or core first year. Murdoch University, for example, provides students with a choice of several Foundation units from which all students are expected to select one in their first semester of enrolment. The focus of the Foundation units is on development of a range of skills, in particular communication and critical thinking skills. Their titles include ‘Age of Information’, ‘Evolution and Revolution’, and ‘Reinventing Australia.’<sup>16</sup>

The idea of a common first year was proposed at the University of Queensland in 1993 in an attempt to achieve some of the key goals of a general education; however this proposal was unsuccessful on the grounds that the university may lose students to institutions offering direct degree program entry, and that students would resent facing a double entry hurdle: first to gain general course entry, and then to get into their course of choice for their second year.<sup>17</sup> Core first year courses within disciplines, such as Engineering, are not uncommon, but there is little evidence of largescale programs involving first year students studying across disciplines at the institutional level, such as in the United States.

Having identified several defining characteristics of Australian undergraduate curriculum models, attention now turns to some of the factors exerting pressure on existing curriculum structures and thus challenging institutions to consider curriculum reform in unprecedented ways.

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<sup>14</sup> Source: <http://www.aacu.org/issues/liberaleducation/index.cfm>.

<sup>15</sup> For further information on the General Education Program at UNSW, visit: <http://my.unsw.edu.au/student/resources/GeneralEducation.html>.

<sup>16</sup> For more information about the Murdoch University Foundation units see: <http://handbook.murdoch.edu.au/units/foundation.html>.

<sup>17</sup> Rosenman, L. (1996). *The broadening of university education: An analysis of restructuring curriculum change options*. Canberra: DEST.

## Key Factors Shaping Current Curriculum Reform in Australian Higher Education

Over the last decade, Australian higher education, like many of its OECD counterparts, has witnessed a move to give preeminence to the fostering of generic, transdisciplinary skills among university graduates. This has been in direct response to industry pressures to ensure that graduates are job-ready, with transferable skills that can be applied across a range of work contexts in a rapidly changing and evolving labour market. Supporting this emphasis on skill development are the professional accrediting bodies in disciplines such as Engineering, Accounting and Physiotherapy. These professional and industry bodies represent a powerful set of forces shaping the undergraduate curriculum in Australia.

The increased emphasis on transferable skill development has led to the compilation of lists of graduate attributes and a move towards outcome-based generic skills assessment revolving around such highly prized skills as critical thinking and cross-cultural communication. Those responsible for designing undergraduate curricula have been challenged to consider ways of integrating generic skills development into existing disciplinary-focused degree programs. Foundation units, such as those described earlier, represent one solution to this challenge, though the debate over the crowded curriculum continues across institutions as individuals and departments fight for undergraduate curriculum territory.

Another set of factors shaping the undergraduate curriculum in Australia has been the move to universal access in the sector (Trow, 2000). The last decade has seen a 36 per cent increase in the undergraduate commencing student population, with more than 60 per cent of young people entering tertiary programs (OECD, 2005).<sup>18</sup> Additional to this growth in the domestic student participation in higher education has been the threefold increase in international undergraduate students since 1994, representing approximately 23 per cent of the total undergraduate student intake. The changing nature and diversity of the undergraduate student population has placed significant pressures for change on the undergraduate curriculum. Some of these pressures include the fact that curricula have had to change to take account of the diversity of background experiences and skills students bring with them into the first undergraduate year. Many academic staff now find themselves under pressure to devote time to the teaching of basic academic literacy skills, such as essay writing, which may have previously been assumed knowledge. Pressures on the curriculum also stem from increasing student demands for flexibility of program delivery and responsiveness in terms of provision of resources, particularly using online technologies.

With internationalisation a top priority in Australian higher education, it is no surprise to find that national policy is now providing the imperative for universities to reform their undergraduate curricula in light of international developments – most notably, the Bologna Process in Europe. In April 2006, the Australian Minister for Education, Science and Training released a discussion paper entitled *The*

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<sup>18</sup> OECD. (2005). *Education at a glance: OECD indicators 2005*. Paris: OECD.

*Bologna Process and Australia: Next Steps* (2006).<sup>19</sup> This report challenges Australian universities to consider the significant implications of the Bologna Process for Australian higher education. A companion website, entitled *The Bologna Process*<sup>20</sup> has also been designed by Australian Education International (AEI). It contains a host of related background materials, including the Brisbane Communique in which Ministers and senior officials from across the Asia-Pacific region outlined agreed actions relating to academic mobility and the possibility of aligning with reform initiatives such as the Bologna Process.

The implications of these developments for undergraduate curriculum reform in Australian universities cannot be under-estimated. Never before has the imperative to align with curriculum developments in Europe been so strong and so evident in government policy. Accompanying this is the pressure on Australian universities to diversify and to market themselves according to their unique and distinctive institutional characteristics: ‘Diversity of mission, competition on equal terms and a clear focus on quality teaching and research are the keys to a healthy and robust higher education landscape of the future.’<sup>21</sup> The increased national attention given to the quality of undergraduate teaching in Australia has also had a notable impact on the shaping of the undergraduate curriculum, challenging universities to explore new ways of configuring and delivering the curriculum to enhance the quality of student learning and outcomes. Catalysts for this reform have included the National Teaching and Learning Performance Fund<sup>22</sup> – introduced in 2005/6 with an initial injection of \$54 million, increasing to \$83 million in 2007 and \$113 million in 2008. The Fund was established with the stated aim of rewarding those higher education providers that best demonstrate excellence in learning and teaching. A related initiative has been the establishment of the Carrick Institute for Learning and Teaching<sup>23</sup> which receives \$22 million per year from 2006 to support a range of activities, grants and awards designed to recognize, reward and disseminate leading practice in learning and teaching. These federally funded initiatives, with their focus on learning and teaching in higher education, have provided the incentive and imperative to review all aspects of the higher education experience, particularly those issues pertaining to curriculum design, delivery and review.

Finally, the work of the Australian Universities Quality Agency,<sup>24</sup> formed in 2000, should not be overlooked as a further catalyst for prompting review and reform of curriculum in the sector. This independent national agency was established to audit and report on quality assurance in Australian higher education on a 5-yearly cycle. It has contributed to more rigorous institution-level analysis of

<sup>19</sup> *The Bologna Process and Australia: Next Steps* is available online at: [http://www.dest.gov.au/sectors/higher\\_education/publications\\_resources/profiles/Bologna\\_Process\\_and\\_Australia.htm](http://www.dest.gov.au/sectors/higher_education/publications_resources/profiles/Bologna_Process_and_Australia.htm).

<sup>20</sup> The AEI ‘Bologna Process’ website may be accessed at: <http://aei.dest.gov.au/AEI/GovernmentActivities/BolognaProcess/default.htm>.

<sup>21</sup> Chubb, I., & Walsh, V. (2005). *Submission on building university diversity: Future approval and accreditation processes for Australian higher education*. Retrieved June 12, 2006, from <http://www.go8.edu.au/news/2005/Go8%20Diversity%2027%2004%2005%20final.pdf> (p.2).

<sup>22</sup> For further information on the Learning and Teaching Performance Fund see: [http://www.dest.gov.au/sectors/higher\\_education/policy\\_issues\\_reviews/key\\_issues/learning\\_teaching/ltpf/](http://www.dest.gov.au/sectors/higher_education/policy_issues_reviews/key_issues/learning_teaching/ltpf/).

<sup>23</sup> For further information on the Carrick Institute see: <http://www.carrickinstitute.edu.au/carrick>.

<sup>24</sup> For further information on AUQA see: <http://www.auqa.edu.au/>.

all dimensions of quality assurance processes, including those related to curriculum. As a result, many universities have undertaken largescale curriculum review and benchmarking activities as part of ongoing quality review processes.

Within the context of these multidimensional factors shaping undergraduate curriculum reform in the sector, it is instructive to observe some of the significant curriculum transformations taking place at the University of Melbourne.

### **Institutional Case Study: Undergraduate Curriculum Reform at the University of Melbourne**

In 2005, the University of Melbourne welcomed a new Vice-Chancellor, Professor Glyn Davis. His arrival marked the start of what is widely recognised as the most comprehensive review of the institution in its 150-year history. Extensive consultation took place across the institution and with an array of stakeholders during the course of 2005. This resulted in a University Strategic Plan (2006) ‘which lays out Melbourne’s aspiration to be a public-spirited institution highly regarded for making distinctive contributions to society in [the triple helix of] research, teaching and knowledge transfer.’<sup>25</sup> At the heart of the ‘Growing Esteem’ initiative is a significant reform of the current undergraduate curriculum across the institution.<sup>26</sup>

The primary aim of these curriculum reforms is to develop a distinctive Melbourne Model of undergraduate degree programs that deviate considerably from the narrow disciplinary focus currently characterizing undergraduate offerings across the nation, as discussed earlier.

“In most but not all cases, Melbourne degrees will be based around a few generalist three-year undergraduate programs leading into intensive two-year professional training or research training at graduate level.”

“As part of this development of a new Melbourne Model, the University will review undergraduate curricula, introduce more professional graduate programs, and strengthen the preparation for doctoral research. As with the Bologna Declaration, which excludes a number of professional disciplines from the ‘3+2’ approach, the Melbourne Model will not be a rigid framework applied regardless of circumstance. The core of the model is graduate entry to professional programs, and timeframes can be adapted where necessitated by particular professional requirements.”

“The guiding principles will be to ensure rigorous standards at both undergraduate and postgraduate levels, keep career options more open at the point of undergraduate

<sup>25</sup> Davis, G. (2006). *From the Vice-Chancellor: Growing Esteem Strategic Plan 2006*. Retrieved June 12, 2006, from <http://growingesteem.unimelb.edu.au/strategicplan/preface.html>.

<sup>26</sup> For further information about Growing Esteem and the University of Melbourne Strategic Plan see: <http://growingesteem.unimelb.edu.au/index.html>

enrolment, and enable more considered choices by students about their further study.”<sup>27</sup>

In order to achieve these goals, a Curriculum Commission<sup>28</sup> was formed under the leadership of the Deputy Vice-Chancellor (Academic), Professor Peter McPhee. The Commission is charged with the responsibility of recommending a 10-year plan for implementing the Melbourne Model by October 2006. This will involve a review of all courses offered across the university.

While taking account of the European curriculum models developed as part of the Bologna Process, the University of Melbourne plans to:

“take account of disciplinary differences and Australian professional standards. Designing and introducing the Melbourne Model will be a case-by-case task.”

“For some disciplines, Melbourne may need to ensure that undergraduate programs cover knowledge bases required at graduate level. In addition, bridging courses may be required to encourage lateral entry to the new graduate schools by students from other universities.”<sup>29</sup>

At the time of this publication, the University has confirmed the introduction of six undergraduate degree programs that will be pathways into graduate professional programs to be introduced over a five-year period from 2008:

“Students undertaking the new Melbourne Model degrees will be required to take part of the course from a program or programs outside their 'core' course, from a range of 'breadth' subjects approved by the 'core' degree program as adding strength to the degree.”

“Deputy Vice-Chancellor (Academic) Professor Peter McPhee says that as well as providing intellectual breadth, the new courses will be based on sufficient disciplinary rigour to be both high-quality 'stand-alone' degrees and adequate preparation for graduate programs.”<sup>30</sup>

As mentioned earlier in this paper, the introduction of a more generalist approach to delivery of the undergraduate curriculum across the institution, leading to specialization at the graduate level, is quite unique in Australian higher education. It is true that general education components exist in some undergraduate programs and, for example, at the University of New South Wales. However, the

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<sup>27</sup> Source: <http://growingesteem.unimelb.edu.au/strategicplan/learning.html>.

<sup>28</sup> For further information on the University of Melbourne Curriculum Commission see: [http://growingesteem.unimelb.edu.au/curriculum\\_commission/index.html](http://growingesteem.unimelb.edu.au/curriculum_commission/index.html)

<sup>29</sup> Source: <http://growingesteem.unimelb.edu.au/strategicplan/learning.html>.

<sup>30</sup> Source: [http://uninews.unimelb.edu.au/articleid\\_3489.html](http://uninews.unimelb.edu.au/articleid_3489.html).

comprehensive nature of these institution-wide curriculum reforms and their implications for both undergraduate and graduate study are quite unique in the sector.

In summarizing the Melbourne Model of undergraduate curriculum transformation, Davis foreshadows that:

“By 2015, the Melbourne Model will be in place. Two major shifts will have occurred: professional programs will overwhelmingly be offered at graduate level, and undergraduate programs will offer a more coherent general education with fewer courses and subjects, and a range of well-defined pathways into graduate study. Undergraduate programs will feature smaller student cohorts, more team-based teaching, and greater online support. Depending on the discipline, undergraduate study may include a semester spent off campus or studying abroad, a research project or a community service project.”<sup>31</sup>

The University of Melbourne curriculum reforms provide an instructive case study of what one large Australian research-led university is doing to attempt to keep pace with and be responsive to national and international forces such as those identified in the previous section. The reforms are a work in progress and warrant close scrutiny and scholarly analysis over coming years.

### **Future Directions and Implications**

Australian higher education is in a phase of unprecedented pressure to maintain, monitor and provide evidence of quality in all dimensions of its operation. At the same time, universities find themselves with no option but to diversify funding sources in the context of reductions in federal funding for public universities, while also responding to undeniable imperatives to compete in the international arena. In such an environment, undergraduate curriculum reform is an inevitability.

The success of the University of Melbourne curriculum review remains to be seen. Many Australian universities and the federal government, itself, await the outcome with anticipation. If Melbourne is successful in terms of attracting students to both undergraduate and graduate programs, and competing effectively in the international higher education market, while also achieving top quality student learning experiences and outcomes, other universities may choose to follow this example.

Some, however, see the University of Melbourne institution-wide curriculum reforms as a high-risk venture that only a large, highly respected and internationally competitive institution could embark upon. It is fair to say that the sector awaits the outcomes over the next decade with keen anticipation. Whether other universities elect to follow the Melbourne path, or to embark on their own models, there is unanimous agreement that the status quo in the sector cannot be maintained. No

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<sup>31</sup> Source: <http://growingesteem.unimelb.edu.au/strategicplan/2015.html>.



matter which paths universities choose, the undergraduate curriculum will continue to be pivotal to institutional efforts to seek new ways of meeting the needs of a diverse student body, while also addressing third stream revenue imperatives and the justified demand for quality in learning, teaching and curriculum processes.

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# Undergraduate Curriculum Reforms in China

Futao Huang\*

## Introduction

Since the 1980s, reconstructing and renewing the undergraduate curriculum at both system and institutional levels has become an important aspect in China's higher education reforms. By reviewing the brief changes in curriculum development and implementation of curriculum in Chinese higher education institutions since the early 1950s, this article deals with recent reforms in the undergraduate curriculum with a focus on research-intensive university curriculum models. This article consists of the following parts: the first part touches on changing undergraduate curriculum in Chinese higher education institutions since the early 1950s; the second part reviews national policy and strategy for the undergraduate curriculum reforms; the third part is mainly concerned with an overview of the undergraduate curriculum reforms with a focus on research-intensive universities. This article concludes by arguing the characteristics of the undergraduate curriculum in current China. By making an analysis of changes and major issues concerning the undergraduate curriculum from a historic perspective, the article will be addressing two major research questions. First, what factors have significantly impacted on changes in the curriculum development in Chinese universities? Second, what are the most striking characteristics of the undergraduate curriculum in Chinese research-intensive universities?

## Basic Data and the Changing Undergraduate Curriculum

The contemporary Chinese higher education institutions can be categorized into three major types: regular public institutions, adult public institutions (only two were private in 2004) and private institutions (*Minban* or *Shehui Liliang Banxue* in Chinese, meaning institutions run by the non-government sector or by social forces). According to the government statistics, there were 1,683 regular institutions in 2004. These institutions are generally composed of universities with undergraduate and graduate education, four-year colleges, junior colleges (*Zhuangke Xuexiao* in Chinese), colleges of higher vocation, and independent colleges. In addition, there were 528 adult institutions in 2004. These are made up of workers' colleges, peasants' colleges, colleges of administrative carders, broadcasting & TV institutions, etc. most of the regular institutions and some adult institutions. Regular institutions are vertically administrated and financed by one of the three types of administrative authorities: (1) The Ministry of Education (the MOE), which was renamed the

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SEC, State Education Commission in 1985, and renamed MOE in 1998, (2) Central level ministries and agencies, (3) Provinces and province-level municipalities. Most of the adult institutions are run by provinces and municipalities with few being administered by MOE and Central level ministries and agencies. As for private institutions, there were 214 in 2004, but only four of them were qualified to confer Bachelors' degrees, mostly being two-year institutions of short-circle programs and almost totally depending on students' tuition and fees.

In addition to the institutions above, there are also some military institutions with nearly 150,000 students each year, most of them being enrolled directly from military troops. Nearly 250,000 additional students are conferred with various certificates or Bachelors' degree through what is termed as the Self-Taught Examination System every year.

From the establishment of the People's Republic of China in 1949 to the early 1990s when the reform of undergraduate curriculum at national level began, the change in the development of undergraduate curriculum in Chinese universities can be practically identified into the following phases.

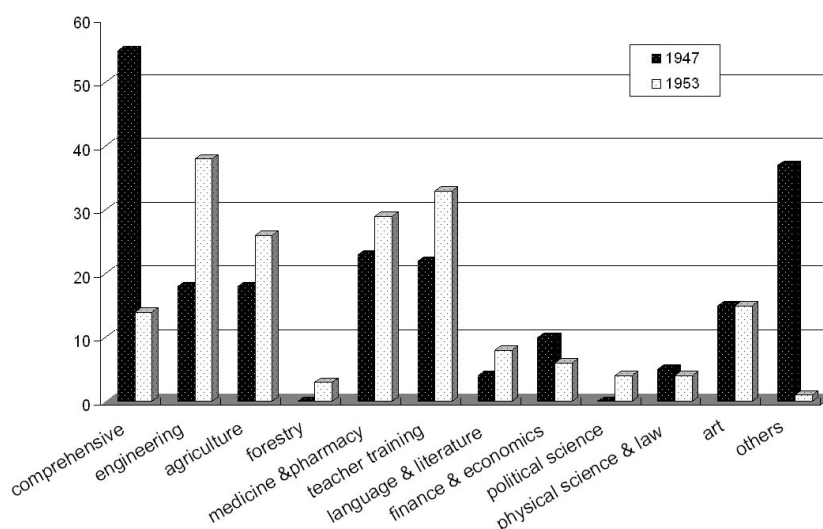
*Introducing the former Soviet Model (1949-1965)* Prior to the establishment of the People's Republic of China in 1949, the basic structure and contents of the undergraduate curriculum in most Chinese universities in the era of the Republic of China, which was founded by the National Party from 1911-1949, were essentially modeled on the American universities. After the establishment of New China, the issue of how to reform the undergraduate education, especially how to form an undergraduate curriculum structure that could respond to the needs of building the socialist China, became a great concern. As Wang and Huang (1997) pointed out, at that time, there were several possible options for the Chinese government to reconstruct undergraduate education: to learn from the former Soviet Union, to retain the curriculum structure; to reform the university curriculum totally according to the American models, or to develop the curriculum based on the experiences gained by the Chinese Communist Party (CCP) in the wartime. Mainly due to political reasons, the then curriculum structure of the National Party had to be reformed in order to be more responsive to the socialist construction. Apparently the theory and practice of the curriculum developed by the CCP in the wartime was deemed to be unsystematic and many aspects had to be improved in the new era. Besides, it was impossible to introduce the American models since the Sino-American relationship had become increasingly intensified after the breakout of the Korean War in 1950. Thus, the only choice that the New China could make was to learn from the former Soviet Union.

In fact, in the summer of 1949, the late Chairman Mao Zedong had already announced that the CCP must "lean on one side": to rely on the former Soviet Union completely. As a result, from 1949 to the mid-1950s, the keyword in China was "to learn from the Soviet Union" in all aspects, including higher education. As for the reform of higher education, the following principles were endorsed by the Central government: "training both the manpower for the industrial construction and teachers as a key

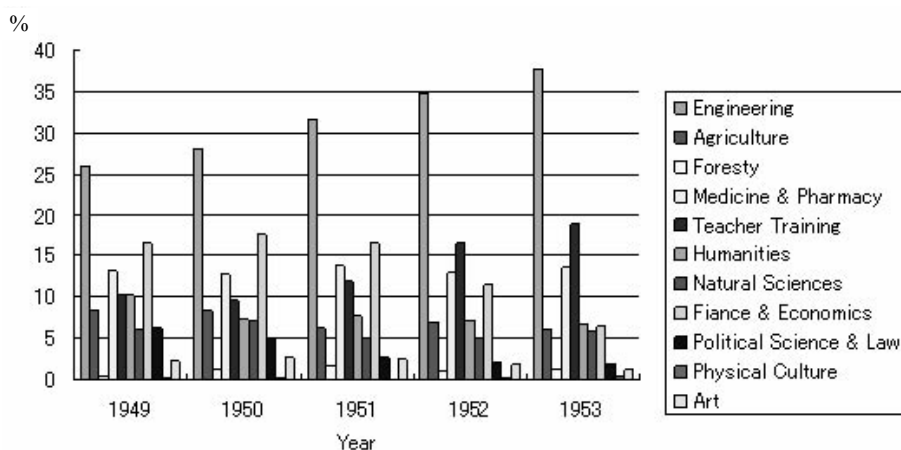
point, developing specialized institutions, and adjusting and strengthening comprehensive universities.”

In August 1951, the first group of Chinese students was sent to the former Soviet Union for study. By 1960, the number of students sent to the former Soviet Union had made up approximately 90% of the total students overseas. On 27 November 1952, according to the MOE, the plan of translating and introduction of textbooks used in the higher educational institutions of the former Soviet Union was implemented. They included almost all the textbooks used in the basic courses in the first and second years of university education, and some of the books used in specialized or professional courses in the third and fourth years of undergraduate education. From 1952 to 1956, nearly 1,393 kinds of the former Soviet textbooks had been translated into Chinese. In November 1951, the Ministry of Education held a meeting attended by all the presidents from universities located in Beijing. In the meeting, it was decided to make a nation-wide adjustment to higher educational institutions of engineering, in accordance with the former Soviet model. Within less than one year from 1952 to early 1953 alone, a dramatic reform was undertaken with a focus on reconstructing the higher education system. By merging and other measures, the Ministry of Education and State Council reorganized three quarters of the higher education institutions and many comprehensive universities were changed into professional or specialized colleges (*Xueyuan* in Chinese). Normally these colleges consisted of one or two fields of study, mostly engineering, natural science, agriculture, forestry, medicine, and teacher’s training. As shown in Figure 1, with a rapid decrease in the number of comprehensive universities, professional institutions such as engineering, forestry, medicine and teacher’s training had expanded substantially. Similarly, as indicated in Figure 2, in contrast to the steady rise in the number of students in engineering and agriculture, the number of students in

**Figure 1. Changes of Institutions by Field of Study**



Source: MOE (1984). *Achievement of Education in China, Statistics 1949-1983*, p.51.

**Figure 2. Evaluation of the Percentage of Students by Field of Study**

Source: MOE (1984). *Achievement of Education in China, Statistics 1949-1983*, p.62.

humanities, especially in both finance and economics and political science and law had dropped significantly.

During this process, the reform of undergraduate curriculum was also undertaken at system level. Basically modeled on the former Soviet Union, one of the most striking changes was introduction of specialties and specializations into Chinese higher education institutions.

The Russian term “specialization” means such a modification of a training program as to give an individual preparation in a certain, narrowly defined body of knowledge. According to Nicolas de Witt (de Wit, N., 1955), there are divisions in Soviet professional education which must be clearly distinguished. They are branch, group specialty, specialty, specialization, and subspecialization. For example, as of 1953-54 the pattern of specialization in Soviet professional education and the respective levels of aggregation can be described as follows:

- Soviet higher education is divided into five areas or branches.
- These five areas are composed of a total of 24 specialty groups or fields.
- These 24 specialty groups or fields represent an aggregate of 295 specialties.
- Some of these 295 specialties are further divided into specializations. There are about 450 specializations, of institute account for 388 and universities for 62.
- Finally, about 135 of these 450 specializations are broken down further into 510 subspecializations. Many of these subspecializations (about 370) are found in the engineering-industrial branch.

Additionally, many other measures were also implemented, for example, a unifying teaching plan and syllabus at a national level, reconstructing educational organizations such as establishment of

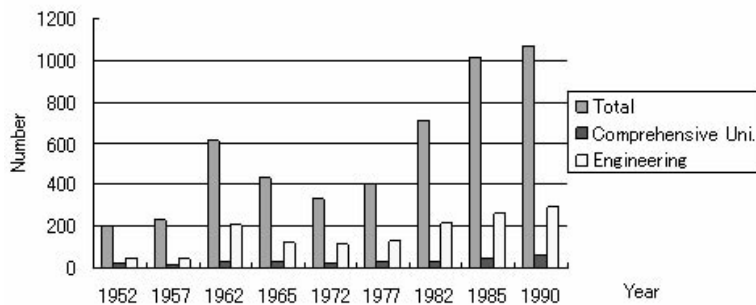
section of teaching and research according to individual subspecializations and translating and adopting Russian textbooks and references, etc.

Since 1958, as more focus had been placed on the socialist construction with regard to the content of curriculum, faculty members and students were encouraged to learn through practical work in factories and the countryside. In particular, subjects concerning politics and class struggle were much more emphasized in higher education institutions. The vast majority of teaching activities were undertaken in factories and the countryside and through various political meetings, social investigation and political struggles. To illustrate, in most cases, engineering teaching activities were organized mostly in accordance with product-making processes in factories instead of being taught by faculty members in classrooms based on textbooks. At the same time, a specialization Committee made up of cadres, teachers, as well as students was established in many institutions so that the curriculum development could be more directly responsive to industry and the socialist construction. As stated by Pepper, since the latter half of the 1950s, China attempted to search for a more rural-oriented “Chinese way,” with deregulation on a similarly unprecedented scale. The Soviet Union was dropped as an overt model but seemed to provide continuing “internal” reinforcement through a de-regularization exercise of its own which occurred at the same time (Pepper, 1996).

*The Great Culture Revolution (1966-1977)* During the ten-year Culture Revolution, a great educational revolution took place in higher education from 1966 to 1976. Except for professional and vocational programs such as engineering and agriculture, the number of programs in humanities and social science, especially the programs concerning foreign studies and law, had dropped substantially. Subjects about class struggle became the primary focus of higher education institutions. Teaching and learning activities were organized with the goal of solving particular problems in industry and agriculture. No systematic knowledge was taught in higher education institutions. In the late period of the Cultural Revolution, almost all higher education institutions were closed and both faculty members and students were asked to be involved in political meetings and many faculty members were sent to the countryside to participate in physical labor. In short, the university teaching stressed extreme pragmatism and curriculum development was characterized by a special emphasis on ideological issues, political studies, and solving practical problems in industry and agriculture.

By the early 1990s, structures of undergraduate curriculum in Chinese higher education institutions had been characterized by several aspects as follows.

First, as a special emphasis had been placed on training professional manpower through specialized education, especially in engineering programs, for industry and for the socialist construction prior to the early 1990s, since the 1950s, professional institutions, in particular the number of engineering institutions had expanded quickly. This indicates substantially that undergraduate curriculum concerning professional education had played a very important role in Chinese higher education institutions.

**Figure 3. Evaluation of the Total Numbers of Individual Institutions**

Sources: *Achievement of Education in China, Statistics 1949-1983*, Department of Planning, Ministry of Education, The People's Republic of China, People's Education Press, p.51; *Achievement of Education in China, Statistics 1980-1985*, Department of Planning, Ministry of Education, The People's Republic of China, People's Education Press, p.20; *Educational Statistics Yearbook of China 1993*, Department of Planning, Ministry of Education, The People's Republic of China, People's Education Press, p16.

Second, central education departments and central ministries and agencies had exercised rigid control and regulation over curriculum development and implementation through various ordinances and documents, especially by adopting the “Criteria for the Establishment of Disciplines or Fields of Study in Regular Higher Education Institutions.”

Similarly to the former Soviet Union, at a system level, except for a very few comprehensive universities, which were normally made up of more than one field of study and specialty groups, the vast majority of higher educational institutions were grouped into eleven types according to the eleven fields of study which were listed in the criteria. All these fields of study were further divided into different sub-fields of study, specialty groups or specializations respectively; among which, they consisted of numerous types of specialties, which were practically categorized according to the social professional or vocational fields. All those types of specialties were further divided into numbers of educational programs. Each higher education institution established and reorganized their undergraduate curriculum in accordance with such national criteria for the establishment of disciplines as described above. Also, based on the nationwide syllabus for each specialty, they formulated an even more detailed syllabus for each subject in consideration of the standards and number of people required for training by the education departments and ministries holding jurisdiction over them.

To be more precise, in 1991, the fields of study included engineering, agriculture, forestry, medicine and pharmacy, teacher training, natural science, finance and economics, political science and law, physical culture, and art. Accordingly, there were eleven different types of non-university professional institutions. For example, in engineering institutions, the structure of undergraduate curriculum could be illustrated in Table 1.

Vertically, although types of higher educational institutions varied according to different fields of study, the educational organizations in both universities and non-university sectors were normally

**Table 1. Structure of the Undergraduate Curriculum in Engineering**

Field of Study	Engineering
Sub-field of Study	Applied Geology, Mining, Power Engineering, Metallurgy, Mechanical Engineering, Electrical Machines & Instruments, radio & Electronics, chemical Engineering, Grain Processing & Food Industry, Light Industry, Mapping, Surveying & Hydrology, Civil Engineering & Architecture, transportation, Telecommunications, and Others
Type of Specialties	364
Number of Programs	4,761

Source: MOE (1991). *Educational Statistics Yearbook of China, 1990*, p.21.

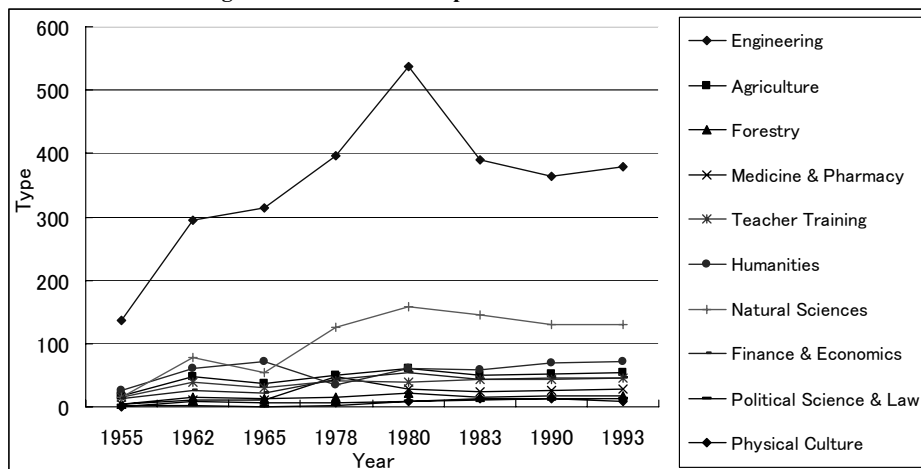
composed of two levels: Department (*Xi* in Chinese) and Specialty (*Zhuangye* in Chinese). Among these levels, the departments were usually set up in light of group specialty mentioned earlier, whereas the specialties were established in accordance with corresponding specialties in the national criteria. Students were enrolled based on different specialties and faculty members were organized at the departmental level. Furthermore, in many big universities and professional institutions, individual specialties were further made up of several Teaching and Research Sections. These sections were founded mostly according to diversified specializations. Thus, the basic organizations in a university or professional institution consisted of departments, specialties, teaching and research sections.

According to the data issued by the Ministry of Education in 1983, the year when the national criterion was firstly modified after the Culture Revolution (MOE, 1983), there were 22 departments in Beijing University, which were composed of 68 specialties in 1982. For example, the Department of Chinese Language and Literature was made up of specialties of Chinese Literature, Chinese Language, Classic Literature and Philology, as well as Journalism. In the non-university institutions such as Beijing Steel & Iron College and Beijing Chemical Industry College, etc., the educational organizations took almost the similar structure.

Closely related to the steady rise in the number of engineering institutions mentioned above, prior to the early 1980s, as indicated in Figure 4, compared with other fields of study, the number of specialties of engineering had increased continuously and strikingly. Even after the 1990s, the number of specialties of engineering still amounted to a much bigger share than any other specialties in Chinese higher education institutions.

Third, as for the development and structure of the undergraduate curriculum, the professional or vocational manpower was trained through various specialties or specializations, which were generally offered, relevant to various social professional or vocational fields. Students of the same specialty belonged to the same specialty, and were instructed with the same curriculum. In general, the subjects of instruction may be grouped into four broad categories and the general structure of curriculum was therefore made up of four parts: compulsory course or subjects (courses that all students had to attend, usually including foreign languages, political courses, physical culture, etc.), basic course (those common basic courses for several specialties, e.g. physics for all the specialties of science, history for every specialty of humanities and social sciences), specialized basic courses (those having direct relationship with specialties, e.g. physiology for the specialty of medicine and that of psychology,



**Figure 4. Evaluation of Specialities from 1955 to 1993**

Sources: *Achievement of Education in China, Statistics 1949-1983*, Department of Planning, Ministry of Education, The People's Republic of China, People's Education Press, p.53; *Educational Statistics Yearbook of China, 1990*, Department of Planning, Ministry of Education, The People's Republic of China, People's Education Press, p.21; *Educational Statistics Yearbook of China, 1993*, Department of Planning, Ministry of Education, The People's Republic of China, People's Education Press, p.17.

economics for specialty of accounting), specialized courses (major courses in the specialty, e.g. the science of accounting for the specialty of accounting, calculus for the specialty of mathematics and Chinese history for the specialty of history, etc.). The four parts were arranged in the order of a triangle or a pyramid in the curriculum system, which originated from the Soviet Union and was introduced into China in 1952 or 1953. If one compares the general structure of curriculum in China before the 1990s with that of the Soviet higher educational institutions in the 1950s, especially in the engineering institutions, one may find a great resemblance between the two (Table 2).

**Table 2. Structures of Curriculum in the Former Soviet Union and China**

Structure of the Soviet engineering curriculum in 1952	Chinese curriculum structures prior to the 1990s
Political and socioeconomic	Compulsory courses.
General sciences	Basic courses
General nonspecialized engineering	Specialized basic courses
Narrow specialization engineering	Specialized courses

Source: de Wit, N. (1955). *Soviet Professional Manpower Higher Education and Professional Training*, p.118 with author's modifications.

### National Policy Context

Although various reforms on undergraduate curriculum had already started in the late 1970s, all those reforms were basically conducted at institutional level and only focused on certain problems, the overall and systematic reform on undergraduate curriculum at both system and institutional levels, guided by the MOE was formally undertaken in 1994.

In 1992, at the Fourth National Working Meeting of Regular Higher Education, the former SCE announced that the teaching reform should be put into the key position of higher educational reforms.

As for the teaching reform, it was mainly concerned with two aspects of teaching activities in Chinese higher education institutions: both curriculum development and curriculum implementation. At the beginning of 1994, the “Reform Plan concerning the Teaching Contents and Curriculum Structure in Higher Education for the 21<sup>st</sup> Century” was suggested and implemented by the Department of Higher Education, SCE. According to the Plan, the final aim of the teaching reform includes several aspects: first is to change the educational mission, renew educational ideas, reform models of training graduates, modernize the teaching content, curriculum structure, and mediums of instruction, and to establish a system of teaching content and curriculum as part of a socialist higher education with Chinese characteristics, which is suitable to the changes of the 21<sup>st</sup> century. The major targets and scope of the reform were as follows: (1) to reform the views and philosophy of education upon examining what knowledge, abilities and potential are required of people in the 21<sup>st</sup> century, (2) to reform the model of talent cultivation and to research and arrange the structure, register, and establishment of specialties, (3) to research and reform the goals and standards of talent cultivation for each specialty or group of specialties, and (4) to research the teaching contents of the basic curriculum and other major curriculum, and at the same time, to reform teaching means and methods to develop teaching contents, the curriculum system and teaching means at the current education skill level.

According to the former SCE, two big achievements should be made. One is to work out some clearly-defined guidelines for cultivating students in some major specialties based on the revised national criteria. The other is to compile a series of textbooks for university students with a high level and quality for the 21<sup>st</sup> century. To sum up, as for national policy and measures for reconstructing structures of university curriculum, they deal with three major aspects:

- more emphasis on basic education;
- less attention to professional education based on specialty; and
- increased consideration given to developing students’ capacities or competencies.

Several major drivers can be identified as affecting the teaching reforms in Chinese higher education institutions since the later 1990s. The most direct and powerful factor is that as China further initiated deeper economic reforms and facilitated the pace of transition to a market economy with Chinese characteristics since 1992, the traditional model of undergraduate curriculum has been severely criticized. Major criticisms include: as the vast majority of institutions were set up by different ministries and agencies at central and provincial levels, undergraduate curriculum were neither responsive nor adequate to the training needs of a knowledge-based society. In relation to the structure of undergraduate curriculum within higher education institutions, until the mid 1990s, science and engineering-related higher education institutions as well as other single-department colleges and universities offered numerous segmented specialty fields.

The administrative system reforms have stimulated changes in the undergraduate curriculum.

According to an investigation conducted on the situation of university autonomy in 20 key universities, many university leaders affirmed that their universities had more autonomous rights than previously (Li, X., 2000), to illustrate:

- universities possess the right to develop specialized courses according to the needs of society and their own considerations, as authorized by MOE;
- they had more freedom to set up their own organizational structures than previously; and
- within the limits of a set quota, they could establish standards for the level of technical and professional posts and award the equivalent of masters' degrees or doctorates;

Another big driver that has impacted on the undergraduate curriculum reforms is the rapid and continuous expansion of enrollments in Chinese higher education institutions since the massification of higher education in the early 1990s. As shown in Table 3, since the early 1990s the enrollments in higher education have undertaken a quick and substantial increase. In 2003 the enrollment reached 19%, indicating the realization of mass higher education in China. The massification of higher education posed new challenges for the undergraduate curriculum.

**Table 3. Change in the Enrollment of Chinese Higher Education**

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
%	6.0	7.2	8.3	9.1	9.8	10.5	11.5	13.3	14.0	17.0

Source: Ji, B. (1999). On the Issue of Gross Enrollment in Higher Education, *China Education Daily*, 16 January 1999 (in Chinese) and online data Retrieved August 30, 2004, from <http://www.edu.cn/20010823/207270.shtml> with author's modification accessed on.

### **Undergraduate Curriculum Reforms since the Late 1990s**

The evolution of undergraduate curriculum reforms since the latter half of the 1990s can be identified into two major phases. In the first phase from 1994 to 1997, many important policies and measures concerning the undergraduate curriculum reforms were issued and put into effect by central government; whereas in the second phase, various attempts related to the undergraduate curriculum have been made at both system and institutional levels.

During the first phase, in cooperation with other related central departments and agencies and local authorities, the former SCE had played a central and vital role in formulating a lot of policies and action plans for reforming the undergraduate curriculum and organizing national research projects.

One of the most extensive and significant measures for the undergraduate curriculum reforms was to implement what is termed the quality-oriented education (*suzhi jiaoyu* in Chinese), which means the education of "the whole student." In addition to academic programs or professional educational programs, the contents of the "quality-oriented education" in Chinese higher education pays special attention to both provision of programs concerning ethics, morality, cultural literacy and emotional intelligence and extra-curriculum activities. It aims at training students' minds, shaping their character, equipping them with a capacity for innovating and taking up new challenges, and fostering their

cultural literacy with the knowledge of the time-honored Chinese and Western civilizations. The quality-oriented education was especially emphasized for undergraduate students in sciences and engineering. By carrying out the quality-oriented education, government expected to change the old models that were characterized by overemphasizing specialized education and to enhance students' capabilities and their cultural aptitude in particular.

Another effort made by the former SCE was to revise the national criteria. The revision of the criteria in July 1993 and in December 1997 involved two aspects. First of all, fields of study or disciplines in higher education institutions were traditionally based on the concept of academic fields as related to technical professions and professional education, but they came to be established according to scientific and academic specialty fields (see Table 4). Next, the national criteria were basically structured around academic fields-secondary courses and primary courses-and disciplines. Based on this, it became possible, through the revision of the specialized education contents, to merge and adjust a number of specialty fields that were narrowly segmented and old, and to create more broad-based disciplines. Consequently, in quantitative terms, the number and type of disciplines decreased considerably, especially those related to science and engineering, and the scope of each discipline expanded. According to the national data, within three years from 1996 to 1998 alone, the total number of specialties offered in higher education institutions has been cut sharply, dropping from about 800 to 250 (Huang, 2003).

**Table 4. Disciplines Established in Regular Higher Education Institutions in 1999**

Course classification	Philosophy	Economics	Law	Education	Literature	History	Science	Engineering	Agriculture	Medicine	Management	Total
Secondary	1	1	5	2	4	1	16	21	7	8	5	71
Specialized	3	4	12	9	66	5	30	70	16	16	18	249

Source: MOE (1999). *Teaching Reform in Higher Education- 1998*, Higher Education Press, p. 19.

Since the early 1990s, the central government has taken some measures for stimulating the undergraduate curriculum. For example, the former SCE established a group of national key bases for basic scientific research and personnel training by investing intensively in a few higher education institutions. In 1991, 84 national key bases of natural sciences were established. In 1994, 51 national key bases of arts and humanities were set up. In 1996, 45 national key bases of engineering were approved, and in 1998, about 30 national key bases of economics came into being. By 2004, national key bases including all of the fields of study listed in the criteria had been established. These national bases have made significant contributions to the undergraduate curriculum reforms in Chinese higher education institutions by issuing many outstanding textbooks and designing various modules of undergraduate curriculum in individual fields of study.

In the second phase, at the institutional level, one of the most striking changes in the undergraduate curriculum reforms was that many departments in which segmented, outdated or overlapping specialties were provided were merged or reorganized into schools or colleges according to the revised national criteria. As a result, in many institutions the traditional internal structure of educational organizations characterized by university or institution-departments–specialty-section of teaching and research had been changed into a new type of university or institution-school or college-department. At the same time, more administrative and academic powers were also delegated into the level of individual schools or colleges. Differing from departments which used to play a vital role in the undergraduate education, individual schools or colleges have become the basic academic and administrative units.

In terms of the curriculum structure, more and more institutions have adopted the practice of admitting students without considering their specialties and offering a vast number of university-wide or school-level selective basic and general programs for students in the first one and half years or in the first two years. Then in the second two years, students are categorized and distributed into different schools or departments and they are provided with inter-discipline, multi-discipline, as well as specialized programs. As for curriculum development, apart from those regular compulsory and selective programs, extra-curriculum lectures or academic activities relating to humanities and social sciences are increasingly offered in most institutions, especially in those of natural sciences and technology. Conforming to the cultivation and improvement of students' qualifications, great efforts in reducing the number of compulsory programs and increasing selective programs have also been tried in almost every institution. Furthermore, students are encouraged to learn the second degree-conferring programs within four years outside their own department or school.

The change in the undergraduate curriculum from 1990 to 2003 in Peking University, one of the leading research-intensive universities in China, provides a distinguishing example. In addition to the decrease in the percentage of compulsory programs and a rise in the share of selective programs by academic credit (Table 5), normally the compulsory university-wide and school-level programs should be completed in the first two years, whereas the compulsory and selective professional programs are to be completed in the third and fourth year. As for compulsory professional programs, it is required that those compulsory programs should be offered at the level of fields of study or disciplines regulated in the national criteria so that they can become common or basic programs for advanced study in a specialized area. Moreover, with regard to selective professional programs, individual schools are thought to provide more and diversifying optional programs and students are encouraged to choose selective programs outside their own schools.

In stark contrast to local and teaching-oriented universities, students in research-oriented universities can complete different curriculum depending on their grades and capacity, even within the same specialty area. Regarding the professional education that is normally provided in the third and fourth years, with a steady decline in the number of segmented and old specialties, two different

**Table 5. Change in the Structure of the Undergraduate Curriculum in the Specialty of Chinese Language**

Structure of the undergraduate curriculum in 1990		Structure of the undergraduate curriculum in 2003	
Credits required for graduation	170	Credits required for graduation	141
Compulsory programs	76.5%	Compulsory programs	nearly 60%
Limited selective programs	8.2%	Selective programs	35.7%
Selective programs	9.4%	Dissertation	4.3%
Practice of professional education	1.2%	Extra-curriculum activities	
Dissertation	4.8%		
Labor	one week per term		

Sources: Office of Teaching Affairs (1990). *Peking University Undergraduate Teaching Plan (Arts)*; Teaching Division (2003). *Catalog of Undergraduate Education Peking University*.

types of professional programs are being implemented in some research-oriented universities, including Peking University. One type includes programs that are mainly concerned with professional and specialized subjects that can help graduates easily find jobs in an increasingly competitive labor market. The other type refers to research programs that are specially designated for students who are potentially suitable to pursue their advanced study at a graduate level. These research programs are aimed at 10-20% of the students and take up the latest trends in individual fields of study. Many research subjects are selective subjects, so undergraduate students can freely select subjects that meet their capacity and grades. Moreover, classes are conducted in accordance with the characteristics of the individual student to foster students' creative abilities while implementing courses comprehensively.

### Implications and Future Directions

As discussed previously, though each institution is required to seek to implement distinctly unique undergraduate education, the current structure of undergraduate curriculum in China is centered on a horizontally-divided mode, with the first half years focusing on university-wide common education and the second half years concentrating on professional education. Generally speaking, the undergraduate curriculum reforms in China over the last decades have been characterized by the reduction of numerous segmented and old specialized programs that were directly catering to technical professions under a rigidly centralized planned economy. At the same time, increased attention has been paid to liberal arts education, with a particular emphasis on expanding basic or common education and placing priority on cultivating various abilities and potentials. What should be mentioned is that these common and basic educational programs are provided not as a direct foundation for specialized education, but as subjects that enable students to acquire personal fulfillment, enhanced potential and broad-based knowledge through cultural understanding. In other words, undergraduate curriculum education is not limited to the transmission of limited specialized knowledge, but also includes the process of developing students' abilities and sophistication. Besides, some apparent efforts have also been made in the flexibility of unit distribution, diversity, comprehensiveness and interdisciplinary common and basic education contents, and improvements concerning the distribution of required and selective subjects and the ratio of required subject lecture

time to the total amount of lecture time. All these efforts are aimed at realizing a transition from a professional manpower to qualified graduates with broad-based knowledge and capabilities in Chinese undergraduate education.

However, professional or specialized education still accounts for an important share in higher education institutions. Research-oriented universities provide no exception. One of the most important reasons might lie in the fact that the labor market still maintains its strong impact on undergraduate education. The importance of professional education is still regarded as an important part of undergraduate curriculum and it will continue playing a central role in Chinese undergraduate education.

The importance of central government and deregulation of academic powers into individual institutions cannot be overestimated, for no significant changes could have happened without both regulation and control by government and autonomous powers at institutional level. Fundamentally differing from all the undergraduate curriculum reforms prior to the early 1990s, the active participation and support by individual institutions and especially by faculty members have led to a new model of undergraduate curriculum in Chinese higher education.

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# **Undergraduate Education, General Education, and the Curriculum: A Perspective from Japan**

Akira Arimoto\*

## **Introduction**

Undergraduate education is thought to be important today because many people inside and outside academia consider it to be one of the key issues with regard to reform of higher education. The Central Education Council (CEC) notably released in 2002 a proposal to promote general education for the first time since 1991 when the University Council (UC) proposed its reform plan for undergraduate education with the aim of improving general education as well as professional education (CEC, 2002; UC, 1991).

On the basis of this situation in terms of policy making and reform related to higher education generally, we are now facing reform of education and especially of undergraduate education, in Japan. Accordingly, it is not unreasonable for us to focus on the theme of “undergraduate education, general education, and the curriculum” as indicated by the designation of an international workshop entitled “Cross-National Analysis of Undergraduate Curriculum Models: The Japanese Context.” In effect, this workshop is concerned with the problems of reform in undergraduate education and especially of general education with a focus on relevant curriculum reform.

The contents of this paper consist of the following five parts:

- (1) Background to the national context for curriculum reform;
- (2) Curriculum models in undergraduate education;
- (3) A case study of the undergraduate curriculum in a research university;
- (4) Creation of a curriculum for general education; and
- (5) A perspective for the future.

## **Background to the National Context for Curriculum Reform**

*Undergraduate Education in Knowledge Society* Typical social changes evident throughout the world include globalization, knowledge-based society, information technology (IT) and marketization (Arimoto, 2002a; 2002b). Among these big changes, the knowledge-based society is becoming a key concept that may have a great effect on the trend of higher education worldwide in the 21<sup>st</sup> Century. To a large extent this has already been recognized in Japan by the release of a report from Central Education Council (CEC) that identifies the knowledge-based society as a key

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concept in the master plan for future higher education (CEC, 2004).

Historically, as a form of imitation, Japan imported some major foreign models of higher education, which had been developed in industrial society, over about one century from the Meiji Restoration until the present day. Now, at the stage of a post-industrial society, it is necessary to create an indigenous Japanese model appropriate to an emerging knowledge-based society. Indeed, in a post-industrial and emergent knowledge-based society, much attention has been paid in Japan to creation of a national identity proper to its own higher education system rather than an imported one. To achieve this it is necessary to seek suitable higher education models from the various models of higher education which have been imported continually over the past century and have now come to compete one with another in the process of reconstructing a higher education system for the 21<sup>st</sup> century. In the process of finding an identity intrinsic to the national higher education system, knowledge is considered to be the fundamental function, because it is believed to lie at the heart of such a system.

In a knowledge-based society, knowledge is located at the core of the university as well as of society as both the material and the function by which academic work as well as social activity are substantially conducted. Especially in academia, by working on the basis of a knowledge function, some core elements – such as discovery, dissemination, application, and control of knowledge – are revealed in the forms of the individual activities of research, teaching, service, and governance, management, and administration.

Some changes in the function of knowledge and particularly of scientific knowledge are recognizable in the fields of humanities, social sciences, and natural sciences. In industrial society, such knowledge is still held closed inside higher education institutions and therefore not apparently open to the surrounding society. It is said that at this stage, academia had already established a knowledge society but one that was not accessible to total society, outside academia. This has to be compared with the requirements of contemporary knowledge-based society, which is dependant on access to knowledge by society as a whole. The author has previously identified the former as “knowledge society 1” and the contemporary situation as “knowledge society 2” (Arimoto, 2002a). Removal of the border between academic and total society is also reflected in the typology of knowledge: Gibbons and others pointed to a diminishing distinction between the two types of knowledge in “mode 1” and “mode 2” in today’s emerging knowledge-based society (Gibbons, Nowotny, Limoges, Schwartzman, Scott, & Trow, 1994).

Development of knowledge today has many effects on the structural reform of society as well as on the reform of academia. Simultaneously, social change has imposed considerable pressure for structural reform of society as well as of academia. Consequently, as far as academia is concerned, learning how to build a new academic system and institutions with accompanying quality assurance through these changing structures has become an absolute necessity: in particular it becomes necessary to form a new national system as well as to restructure individual institutions in relation to undergraduate education.

*National Policies* In every advanced society the higher education system is expected to be useful and productive in academic work so as to contribute through high academic productivity - including, for example, research productivity and teaching productivity - to the system of politics, economy, culture, science. At the same time, higher education is required also to contribute to society by enhancing its own academic work, especially in development of human resources, including undergraduate education and learning, graduate education, general education and professional education. Accordingly, it is not surprising that a national government should be much involved in decision-making processes related to the higher education system. The Japanese government has paid much attention to this matter by asking a series of national councils to release proposals with respect to higher education policies and plans.

Even so it appears remarkable today for a national government to think about the curriculum for undergraduate education. From 1991 to 2006 a series of national policies and plans has been issued. In 1991, the UC proposed a so-called “deregulation policy” including curriculum reform at undergraduate level and introduction of self-review and evaluation; in addition it also proposed integration of general and professional education at the undergraduate level. However, if we take a retrospective overview of it from the present day, after a period of some fifteen years, the proposal to bring about an ideal general education curriculum and re-organization of the undergraduate course was not fully successful (Arimoto, 2003a).

Seven years after the 1991 report, the UC recommended the necessity of further academic reform in a new report issued in 1998. This contained several core recommendations chief of which were the following: (1) reconstruction of knowledge; (2) enhancement of teaching and research; (3) rationalization of management; and (4) diversification of evaluation. It is clear that recommendations (1) and (2) stress autonomy in regard to the former recommendations, and recommendations (3) and (4) stress accountability. It is especially notable that the UC proposed the necessity of reconstruction of knowledge and in addition the enhancement of teaching and research with an emphasis on teaching at undergraduate level and research in graduate school (UC, 1998; Arimoto, 1999).

In 2002, the CEC also demanded rethinking of curriculum reform for undergraduate courses (CEC, 2002). The CEC also recommended and introduced a new accreditation system in 2004, as part of a new master plan for higher education that emphasized the requirements of the knowledge-based society mentioned previously (CEC, 2004). Most recently, in 2006, the science and technology basic plan, which was initiated from 1996 to 2000 in its first stage and from 2001 to 2005 in the second stage, and has now entered into a third stage of five years from 2006 to 2010 (Arimoto, 2005a).

As far as these trends are concerned, it is evident that the new structure for general education has received much attention both inside and outside academia. For example, the CEC released a proposal in 2002 recommending a strong necessity for general education in 21<sup>st</sup> century undergraduate education. In it we can recognize four recommendations for the promotion of a general education curriculum (CEC, 2002).

- (1) Improvement of curriculum reform and teaching methods to the extent of “teaching giving impression and emotion and provoking intellectual curiosity.”
- (2) Arrangement of systems encouraging the engagement of academia and academics to general education.
- (3) Establishment of organization for implementing general education in all universities and colleges.
- (4) Promotion of students’ exchange with society and culture abroad.

### **Curriculum Models in Undergraduate Courses**

Undergraduate education is confronted with many problems that require improvement and reform. To understand the current situation, we have to discuss the following problems:

- (1) Traits of undergraduate education;
- (2) Import of undergraduate education from abroad into Japan;
- (3) Organizational reform of undergraduate education; and
- (4) Curriculum reform.

*Traits of Undergraduate Education* The traits of Japanese undergraduate education derive from importation of models from advanced western countries into the Japanese higher education system. Pre-war, for example, a German education model was imported for the undergraduate level and also for the accompanying professional education. Post-war, it was an American education model that was used for both graduate and undergraduate levels. However, while the German model had worked continually and substantially for many years, the American model for general education, introduced in 1945 at the end of World War II has not proved successful during the post-war period through to the present.

General education, which basically takes four years at the undergraduate level in the United States, was institutionalized into Japanese undergraduate education in a modified form limited to two years in a Faculty of General Education (*Kyoyo-bu*) and constituted the first half of the undergraduate course. This new type of general education, which existed over the fifty years from 1945-1991, was constantly confronted with struggles, and conflicts with the demands of professional education, which had been institutionalized in the undergraduate program since pre-war years.

In 1991 when the Ministry of Education, Culture, Sports, Science and Technology (MEXT) initiated higher education reform, it took the form of deregulation at the undergraduate level in attempt to integrate general education with professional education: this officially required students to obtain 124 credits in order to qualify for graduation (at the level of BA, BSc).

*Organization of Undergraduate Education* When MEXT introduced its 1991 ordinance, many universities and colleges attempted to abolish the Faculty of General Education (*Kyoyo-bu*),

which had provided the base for general education throughout the post-war period. The range of subsequent developments fall into the following six categories.

- (1) Of the 36 national universities that had *Kyoyo-bu*, only one institution, Tokyo University of Dentistry and Medicine exceptionally retained it.
- (2) Some universities, such as Kobe University and Kyoto University, set up new Faculties.
- (3) Some institutions relocated the former faculty members of *Kyoyo-bu* to other Faculties and Departments.
- (4) Hiroshima University was and still is one of the very few institutions in terms of general education as well as undergraduate education in Japan that as early as the 1970's had established a Faculty of Integrated Arts and Sciences to replace *Kyoyo-bu*.
- (5) Some institutions established a "committee type organization" for general education.
- (6) Two universities, the International Christian University (ICU), a private university, and the University of Tokyo, established Faculties of Liberal Arts.

Appearance of a competitive and diversified range of structures for general education as well as undergraduate education differs markedly from the former situation where the Faculty (*Kyoyo-bu*) was substantially the only type of organization providing general education. In addition to the collapse of *Kyoyo-bu*, general education (*ippan-kyoiku*), which had lasted for about fifty years, was also transformed to liberal arts education (*Kyoyo-kyoiku*): the tradition and practices of half a century of general education effectively vanished (Seki, 2006). Without the basis of *kyoyo-bu*, disciplinary integration as a component of general education (*ippan-kyoiku*) was lost to a considerable degree, although, at least superficially, the nomenclature seems to imply recovery of the older tradition of "liberal arts education" (*kyoyo-kyoiku*), derived originally from universities of the Middle Ages. In effect, it indicates creation today of a period of anomy and anarchy in terms of general education organization and curriculum in Japanese higher education (Arimoto, 2003a).

### **A Case Study of the Undergraduate Curriculum in a Research University**

*Curriculum Models in Undergraduate Education* In accordance with the reflection of these diversified directions, the curriculum for undergraduate education has also been diversified to correspond to the organizational differentiation. At least three types of curricula can be found: a Faculty of General Education (*i.e.* the traditional type, which lasted throughout the post-war period to 1991); an Integrated type (a new format); and a Faculty of Liberal Arts (as at ICU and Tokyo). At an undergraduate level, general education will coexist and also compete with professional education except where there is a Faculty of Liberal Arts (*Kyoyo-gakubu*) as in the case of ICU, which appears to be almost equivalent to an American type of undergraduate education. The integrated type seeks especially to integrate general education with professional education over the four years of the

undergraduate course in order to conform to the requirement for 124 credits at graduation.

As a result, various types of curricula have been invented and introduced so as to make integration of the dual educational requirements: for example, a “three-tier structure” (as in the University of Tokyo); a “package subject and program system” (as in Hiroshima University); a “core curriculum” (as in Hokkaido University); “all campus education”; a “professional core subject”; “wedge type education”; “major and minor subjects, and concentration” (Arimoto, 2003a; Ogasawara, 2003; Seiwa, 2003; Kobayashi, 2003).

*Teaching in Undergraduate Education* Related to the curriculum reforms, innovation of the teaching-learning process has also become a target in the area of the undergraduate and general education.

Components of the teaching-learning process consist of three elements: curriculum, teacher, and student. There are also three stages: of input, throughput, and output, in the process of teaching-learning. Among these, the classroom, which is the core location of the teaching-learning process in academia, is a microcosm of the knowledge society previously discussed, so that knowledge – or advanced knowledge as an academic discipline - is an important factor which owns its own culture and climate.

*Effects of Undergraduate Education* The effects of the teaching-learning process are related to integration of various effects with regard to the curriculum, student, teacher, and educational environment. Assessment and evaluation of the teaching-learning process is finally obtained by self-monitoring and evaluation, by mutual evaluation, and from third party evaluation or accreditation: the last of these was introduced in 2004 when MEXT authorized three organizations to undertake evaluation of quality assurance in all institutions over a span of seven years.

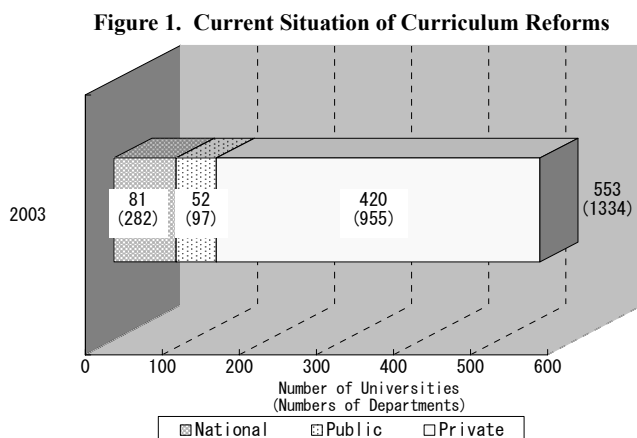
### **Creation of a Curriculum for General Education**

Historically, general education was institutionalized in universities and colleges as a consequence of the transformation from a liberal arts education curriculum to a general education curriculum in the long history of evolution of higher education. Liberal arts education was established in European universities of the Middle Ages on the basis of their traditional curriculum derived from the study of classical Rome and Greece. We can categorize many characteristics related to liberal arts education: the seven liberal arts; Faculties of Arts; Latin and Greek languages; collegiate education; recitation; *in loco parentis*; the osmosis process; tutorials, etc. Medieval universities have been followed by the emergence of modern universities and colleges. In 1945, James Conant introduced at Harvard University in the USA the concept of general education in the so-called Red Book (Conant, 1945). This new concept was immediately imported into the Japanese higher education system at undergraduate level and survived until 1991 when it was transformed by the effect of MEXT's

ordinance into a wide range of variations: the core curriculum; major and minor courses; elective systems; colleges of liberal arts; accreditation, accountability; credit points; grade point averages; and many other attributable characteristics.

*Evaluation of the General Education Curriculum* According to a recent survey made by MEXT (2005), the status of curriculum reform in universities and colleges by sectors is as shown in Figure 1. During the past four years (2000-2003), 553 universities and colleges, or about 80% of all institutions, and 1,334 members of faculty, or about 75% of all faculty members respectively, have conducted curriculum reform.

To improve the current confused and anarchical situation, enhancement of general education is necessary in order to meet four groups of criteria: (1) implementation system; (2) arrangement of curriculum; (3) teaching method; and (4) effect of teaching.



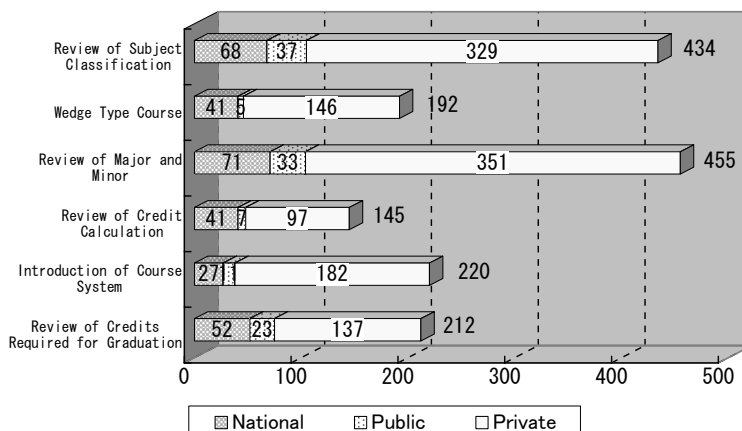
Source: MEXT (2005). [http://www.mext.go.jp/b\\_menu/houdou/17/03/05060902/001.htm#top](http://www.mext.go.jp/b_menu/houdou/17/03/05060902/001.htm#top)

Among these criteria, re-arrangement of the curriculum has proceeded but only to a limited extent in the specific categories identified in the details of curriculum reform shown in Figure 2. In some categories, for example, “review of major and minor subject” and “review of subject classification” changes are going ahead in all sectors; in others they are being implemented selectively, for example, “introduction of course system”, “review of credit for graduation” and “wedge type course.” It is though manifest that “review of credit calculation” has not progressed well because of delays to strict evaluation of credit even though Japan imported the American credit system in the immediate post-war period.

The situation for implementation of general education (Figure 3), shows that, to a considerable degree, diversification in general education allocation in all subjects is progressing. Implementation of some subjects appears to be very popular: “training ability for using information”; “subjects related to health of mind and body”; “basic subjects for professional education”; “social and academic

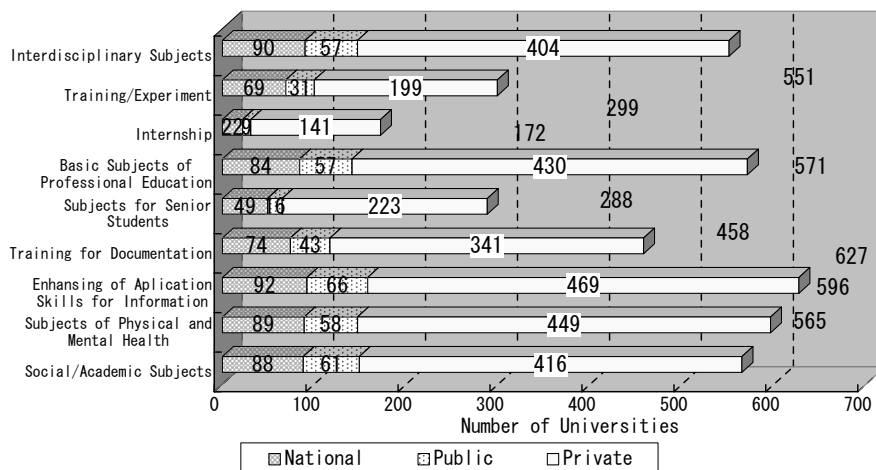
themes”; “interdisciplinary and comprehensive contents”. On the other hand, some subjects are only now becoming popular, for example: “internship”; “subjects for junior and senior students.”

**Figure 2. The Contents of Curriculum Reform**



Source: MEXT (2005). [http://www.mext.go.jp/b\\_menu/houdou/17/03/0506\\_0902/001.htm#top](http://www.mext.go.jp/b_menu/houdou/17/03/0506_0902/001.htm#top)

**Figure 3. Access to new Subjects in General Education (2003)**



Source: MEXT (2005). [http://www.mext.go.jp/b\\_menu/houdou/17/03/0506\\_0902/001.htm#top](http://www.mext.go.jp/b_menu/houdou/17/03/0506_0902/001.htm#top)

According to the survey on reforms in general education made by MEXT, the teaching revolution is likely to go well at least to some extent. Various kinds of functional approaches to general education are manifestly and functionally being undertaken to replace *Kyoyo-bu* after its fifty year existence.

*Results of National Survey on Curriculum: Problems* However, when we consider in detail these functional approaches, there are still left many problems to be improved as soon as possible.

There are, for instance, problems of (1) curriculum, (2) enterprise and organization, (3) academic staff, and (4) students.

First, the goal of a general education curriculum has yet to be successfully realized. Although the main goal was how to integrate general and professional education according to the 1991 doctrine, in order to realize this, some concrete reforms are needed. These include: re-arrangement of the core curriculum; course concentration, major and minor courses as important parts of the general education curriculum; arrangement of a balanced curriculum between the required or non-elective elements and the semi-required or elective subjects for students to take; re-arrangement of the general education curriculum among all Faculties across the campus as part of its integration with the professional education curriculum; adoption of an obligation by all faculty members across the campus to participate in teaching general education; and construction of a systematic curriculum structure to effect an integration of the two curriculum cultures of general and professional education. These purposes have not been embodied well either in the national system or in individual institutions over the fifteen years following the 1991 doctrine.

Second, in the enterprise of higher education, universities and colleges have constructed a strong Faculty autonomy for many years. The basis of academic autonomy and the consequent organizational tradition and climate is not necessarily appropriate for pursuing campus-wide general education, which is expected to be adopted in all Faculties throughout the campus as a common pattern of education. Indeed, achieving a consensus among faculty members for the purpose of integrating enterprise and organization for general education is not well-established; general education seems to be regarded largely as a part of the preparation and foundation for professional education.

Third, Japanese faculty members have had a strong affinity with a research rather than a teaching orientation. This was clearly indicated by an international survey of the academic profession conducted by the Carnegie Foundation for the Advancement of Teaching in 1992 (Altbach, 1996; Arimoto & Ehara, 1996). Even today this attitude has not been completely modified. There are though some symptoms of transformation from a research orientation to one combining both research and teaching in the responses to a recent national survey of the academic profession (Arimoto, 2005b).

Reform of academic staff's consciousness and behaviour is expected to alter from that of a primarily research orientation to one that integrates research and teaching, and finally to one integrating research, teaching and learning. For this purpose, reconsideration of scholarship will be necessary among faculty members. Ernest Boyer pointed out that teaching is situated at the pinnacle of a stratified structure of scholarship consisting of research, application, integration, and teaching (Boyer, 1991). In this context, it is notable that MEXT introduced Faculty Development (FD) as a semi-obligation in an ordinance in 1998, and as an obligation in 2004. Based on this series of policies, all faculty members are required by national law to undertake FD and to pursue a teaching orientation.

Fourth, by virtue of the emerging massification stage of higher education, students have diversified to the extent that their ability in learning and their scholastic aptitude have indicated many problems



needing to be resolved as soon as possible. It is perhaps correct to say that their capability for achievement has declined to a great extent compared to that of previous generations according to the relevant national and international researches (Altbach, 1996; Arimoto & Ehara, 1996; Arimoto, 1996). A remedy for this situation through general education and curriculum reform has not been achieved so far in spite of the introduction of various new devices such as remedial education, introductory education, first-year education, and transformative education (MEXT, 2005).

These facts show that the present situation remains fairly problematic in a perspective of promoting undergraduate education and general education. In addition, it is still more problematic if we consider the data of a national survey of academics on the status of the curriculum with regard to the viewpoints of “knowledge, technology, and attitude being obtained in undergraduate education” (Arimoto, 2003b).

According to the results shown in **Table 1**, the gap between teachers’ expectations of students is clearly shown in the fairly low scores to the 23 questions. About 3,000 faculty members nationwide responded to all of the 23 questions negatively with more than 50% of them indicating that they thought students’ showed insufficient mastery of these elements of general education in undergraduate courses (Arimoto, 2003b, pp. 220-221).

**Table 1. Areas of Knowledge, Technology and Attitude Covered in Undergraduate Education (opinion of academics)**

1. ability of understanding sentences	13. concern for arts and culture
2. ability of explaining sentences	14. student’s future
3. ability of presentation	15. viewpoint of ethics and society
4. ability of discussion	16. new view of the matter
5. ability of mathematics	17. common sense
6. nexus of knowledge and reality	18. self-reliance
7. ability of logical thinking	19. inquiry
8. ability of comprehensive judgement	20. tolerance of others
9. patience	21. ethics
10. broad knowledge	22. volunteer spirit
11. concern for social problems	23. criticism
12. concern for nature and universe	

Achievement in some items is typically thought to be insufficient by a substantial majority of academic staff: “ability of discussion with others” (82%); “broad knowledge” (77%); “ability of comprehensive judgement” (77%); “ability of explaining sentences” (75%); “nexus of knowledge and reality” (74%); “ability of logical thinking”(74%); “concern for social problems” (73%); and “ability of presentation” (73%).

Attainments in these areas would probably be evaluated much higher, if the teaching-learning process in the classroom were conducted adequately to meet the aims of general education. In other words, general education sufficient to meet the goal or benchmarking level was not achieved. That is to say, in general education and its curriculum quality assurance was not well realized. This situation has to be improved as soon as possible in the future.

## **A Perspective for the Undergraduate Education Curriculum in the Future: The Direction of General Education**

Based on the previous discussion with regard to current general education and the curriculum, it is clear that higher education reforms, especially general education curriculum reforms, have yet to achieve success in spite of their crucial necessity. There are therefore many problems to be resolved, requiring much effort from now on.

We have to discuss the future direction of general education in terms of a transformation of the general education curriculum at undergraduate level and to define the mission of general education in the 21<sup>st</sup> century. In the past, general education belonged in the realm of the high school. In the post-war period it moved to the first half of the undergraduate course on introduction of the American model into the Japanese traditional structure that had basically used a German model, imported in the pre-war years. A change to all stages of the undergraduate course has been clearly expected since 1991 when the UC and MEXT presented respectively their report and ordinance. The ideal direction of general education was shown in each report and ordinance.

In the event, many institutions have not realized the ideals of general education for reasons previously described. While many universities and colleges failed to achieve the ideals identified in the 1991 doctrine, some universities and colleges – including Hiroshima University, one of the research universities – have consistently been able to work towards them. Indeed, from the year, 2006, Hiroshima University is moving to a future type of general education by institutionalization of a Graduate School of Integrated Arts and Sciences. This is the first instance of such a development in Japanese universities and colleges, and still maintains the obligation of all faculty members to teach up to almost 80% of all general education curricula in the undergraduate course.

This, one of the most successful approaches, is thought to come close to the American model of general education in the context of Japanese undergraduate education. Another successful approach is that of the University of Tokyo which, together with ICU, has adopted its own unique way as described above of implementing a pattern similar to an American model. Apart from these few successful cases, many other institutions are now more or less confronting a difficult situation. Their most important problem is perhaps how to re-arrange the curriculum of the existing general or liberal arts education systematically.

The spirit underlying the University Council's proposal in 1991 was for reconstruction of general or liberal arts education in order to enrich university education. Integration of general and professional education was intended to reinforce and strengthen its role. In practice, deregulation has been widely interpreted as opportunity to abolish *Kyoyo-bu* and to emphasize further professional courses. The developments at Hiroshima University, the University of Tokyo and ICU conform to a pattern consistent with the aims of the University Council. At Hiroshima, the discipline of integrated arts and sciences is recognized and established as a basic element intrinsic in the concept of general education. Creation first of a Faculty of Integrated Arts and Sciences (*Sogo Kagaku-bu*) and now a

Graduate School of Arts and Sciences identifies the central role that general education occupies in the reconstructed schedule.

The contribution made by the new Graduate School has yet to be demonstrated: expectations should be high. A lack of attention to the educational objectives of general education accompanied its decline over the past years. Assumptions that traditional and conventional courses continued to satisfy the purpose were too easy. Requirements for modern students and for integration with modern professional courses need fundamental study.

Reappraisal of the effectiveness if not the value of traditional general education is inevitable. Its origins lie in the American model, which failed to become institutionalized in Japan over the past half century. In America itself, many would now argue that apart from remedying the failures of American high school education, currently it does not achieve the historic objective of providing general education. Indeed, some would claim that in the absence of a consensus of what constitutes general education, this is not an achievable objective. In Japan, the cultural context differs significantly. The original American concept has gradually become modified, over the years: even the ICU, which is the institution most American in type with regard to general education, has innovated in its Faculty of Arts and Sciences to yield a version more appropriate to the different climate and culture of Japan. The need to develop or to select from a wider spread of international programs a range of responses reflecting indigenous needs becomes imperative.

The aim of liberal arts education derives from the concept of "*paideia*", or human education, in classical Greek. In the modern age, this prototype is not attainable in a situation where we lack the academic discipline of a science of liberal arts or a science of integrated arts and science, since the decline of *kyoyo-bu*. Furthermore, inadequate arrangements for the core-curriculum, major and minor courses, course concentration, and the many other related issues imply an insufficiently systematic arrangement for a liberal arts education curriculum. This situation can be seen as an "anomy", or as an absence of norms, a "normless" development of a liberal arts or general education curriculum, even though there are a few institutions trying to create a new discipline of general education through the process of integration of general education and professional education at the undergraduate and also postgraduate level.

### **Concluding Remarks**

(1) In discussing the background to the national context of curriculum reform, the author has focused on the social changes as well as higher education reforms that strongly demand curriculum reforms. The national government has responded intensively and consistently to these changes by introducing a series of policies with master plans for higher education on the basis of the recommendations of various councils.

(2) Advanced knowledge, or academic discipline, is playing an important role in the process of curriculum reform in universities and colleges in the shape of reconstruction of knowledge, not only in

“knowledge-based society 1” but also in “knowledge-based society 2.”

(3) In Japan, advanced models of curriculum developed previously in Western university systems were imported for many years after the establishment of modern national universities and colleges. As a result two main models, those of the German and the American university systems have competed with each other both across the overall system as well as in individual institutions leading to many conflicts, even today. In this sense, the Japanese curriculum at undergraduate level has been formed by a process of importation and integration of foreign models. As a consequence, achieving a Japanese identity in the higher education curriculum is an important problem yet to be resolved.

(4) According to a recent national survey, curriculum reforms in the post 1991 period were not successful to the extent that many universities and colleges now confront a kind of anomy and anarchy in the construction of a higher education curriculum, especially in the field of general education.

(5) In this difficult situation with regard to general education and curriculum, some universities and colleges have attempted to introduce initiatives to conform to the ideal directions. Hiroshima University, as one of the research universities, has over many years established a new structure for general education and curriculum and is now shifting toward the next stage of general education and curriculum reform. The outcome of this reform is not yet clear because of the continuing program of reform but, over time, it will be realized and the results quantified by the processes of self-evaluation and third party evaluation.

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## **Higher Education in the UK: the Special Status of Physical Science and Engineering**

Keith J. Morgan\*

The 20th century saw a huge expansion of higher education in all countries and at all levels. In universities, the past 50 years have been devoted to growth, expansion and widening access. Economically advanced countries have now achieved mass higher education, embracing upwards of 40% of young people. The benefits are evident: aspirations for access have become entitlements for women as well as men; wealth has been generated by increased productivity; societies have benefited from educated electorates. Over-riding all else it is seen that growth of higher education has been accompanied by affluence and improved qualities of life.

Politics and economics have been the driving forces for these changes; and inevitably, they have been instituted by governments, not universities. It is true that universities identified the link between knowledge and affluence but it was a political response to the “white heat of the technological revolution” that led to action. This linked education, employment and the economy as a single vital element in state affairs. As is normal, politically inspired government policies yield diverse results when they are implemented across differing political systems. Social demand for increased financial support for education permitted the developments; but equally, it encouraged a governmental fallacy that the needs of the market should determine provision of education.

The results are impressive. Huge expansion in participation, numbers of graduates, size and numbers of institutions have been achieved. There are increases in the range and diversity of academic programmes, in patterns of study, and in the quantity and quality of research. Equally impressive have been the increases in overall costs. The influence of developments in the United States has been particularly important, especially in the statistics they have yielded: participation rates of over 60%, with 16 million students in 3,000 institutions and annual expenditure of \$130 billion. But the statistical role model this has provided has not extended to structural developments in the national systems of other countries. It may indeed be that the very absence of a national system of higher education in the United States has allowed development of their rich diversity of higher education institutions. They range, in the terminology of the Carnegie classification, from Research Universities, Doctoral Universities, and Comprehensive Universities, through 4-year Colleges and Liberal Arts Colleges to 2-year and Community Colleges. This very diversity has facilitated and expanded with mass higher education in a way that is not echoed in other countries. Moreover, it has

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also accommodated the outcomes of simultaneous development of mass secondary education in a way not found elsewhere. One consequence is that this has allowed the United States to combine one of the less successful systems of secondary education with the world's most successful system of higher education.

Elsewhere, the existence of national systems of higher education and education generally has followed different courses. While expansion of universities has been facilitated, massification of higher education has been achieved by utilizing a parallel stream of institutions: polytechnics in the UK, private colleges in Japan, CAE's in Australia, technical high schools in many European countries. In many cases the combination of governmental initiative, central planning of provision, and increased public expenditure necessarily implied conformity to existing national policies and prescriptions for provision of higher education. In contrast, in the UK, where the universities are autonomous institutions, there is no tradition of national policy or provision for courses or curriculum.

Through creation of the polytechnics in the UK in the 1960s, the government sought to respond to a need for rapid expansion of access to higher education. This expectation was fulfilled. By the 1990s participation rates had quadrupled. By that time also the polytechnics had become universities, and both they and the established universities had broadened the pattern of higher education courses, established courses in new subject areas, expanded provision for sub-degree 2-year diploma courses, and hugely expanded opportunity for part-time study.

The statistics (Table 1) illustrate the scale of these changes. Over a period of 40 years, the total number of undergraduate students has increased by a factor of 11 (*i.e.* 1100%). This is impressive but it is not a complete picture. The great increase in undergraduate numbers in the universities is not distributed uniformly over all subjects. In particular, numbers of students studying the physical sciences, mathematics and engineering have shown much smaller increases. So much so that while the demand for science and engineering graduates has been sustained and commercial and governmental expectations have led to unprecedented resources and opportunities for development, yet in the universities, departments of science and engineering have been closed and continue to close. Moreover, while provision for mass higher education has caused courses to be restructured to accommodate non-traditional and less well-prepared students, science and engineering departments have chosen to extend the length, academic depth and rigour of their courses.

The prime causes of these structural changes can be found in a range of influences, social, educational and economic. They can be grouped in categories of internal university factors, pre-university factors largely affecting secondary education, and external factors derived from professional and economic considerations. The results provide a striking illustration of some of the inherent characteristics of the role of universities in the UK.

### **Internal University Factors**

In England, the characteristic pattern of the traditional first-degree courses has been the 3-year



'honours' degree with specialization in a single subject – history, economics, engineering, chemistry. A conventional pattern has been to study three subjects in the first (freshman) year, two in the second year and one in the third and final year. So in chemistry, a common pattern would be for students to study chemistry, physics and mathematics in the first year, chemistry and physics (as a minor subject) in the second year, and chemistry alone in the third year.<sup>1</sup> The level of attainment in the special subjects of the 3-year honours degrees is widely recognized as at least equivalent to that found elsewhere from 4-year undergraduate programmes. Achieving this standard is implicitly dependent on three conditions.

- (a) Necessary provision of general education has been achieved on completion of secondary education: no university provides courses of general or 'liberal arts' education as integral part of the required degree schedules.<sup>2</sup>
- (b) Basic principles of the subjects to be studied at university will have been covered in secondary school.<sup>3</sup>
- (c) University courses are intensive throughout the 3-year undergraduate courses and require full-time study.<sup>4</sup>

Following massification of both secondary and higher education, there is abundant evidence that it is currently no longer possible to assume that any of these conditions is generally satisfied. The social benefits of mass education have educational consequences. The large increases in student numbers (Table 1) imply wider spreads of ability, attainment and aspiration. The consequence, as seen by the universities, is a necessity to include more peripheral and introductory aspects even of special subjects – whether it be differential equations and calculus, mediaeval history, foreign languages or organic chemistry. This provides universities in the UK with the same problems that are regularly identified in Japan, and well documented in the USA, of needing to complete the process of secondary education before higher education can begin (see *e.g.* Clark, 1997).

The statistics in Table 1 identify three further fundamental changes: the number of women in higher education, little more than a quarter of the total in 1966, is now a majority; the number of part-time students has risen from 2% to 34% – one in every three students is now part-time; and the number of students pursuing sub-degree courses has risen similarly from 2% in 1966 to 30% in 2003. The increase of women students represents an important social, cultural and economic advance;

<sup>1</sup> This implies that students will have studied all 3 subjects to an appropriate standard at school.

<sup>2</sup> In the 1960s, Keele, then a small new university, introduced a four-year undergraduate schedule with a compulsory programme of liberal arts education. Subsequently this was modified to become an optional programme. It proved popular neither with students nor employers and was withdrawn in the 1970s.

<sup>3</sup> Historically, the schools' examinations, School Certificate and Higher School Certificate, which preceded the current the General Certificate of Education, Ordinary level and Advanced level, were organised by the universities and constituted 'matriculation', *i.e.* a qualification for entry to university.

<sup>4</sup> Requirement of full-time study implied that students would not take part-time jobs. Provision of means-tested maintenance grants to students was accordingly justified on social and educational grounds. It was also valid on economic grounds through facilitating completion of courses within 3 years. Grants were replaced by loans and finally withdrawn in the 1980s.

educationally it has modified the balance between courses; but academically and institutionally it has not given rise to substantial structural change. In contrast, the increase in part-time students and sub-degree courses constitutes one of the profound structural effects of mass higher education. To accommodate these non-traditional students, and also the large number of full-time students now combining study with part-time employment, the universities have needed to change fundamentally their academic programmes.

**Table 1. Undergraduate Students in Higher Education (UK)**

All undergraduates	1966-7	2003-4	
			Increase
<b>Full-time</b>	155,478	1,069,210	
<b>Part-time</b>	2,793	547,020	
<b>Total</b>	158,271	1,616,230	x 11
<b>First degree courses</b>			
<b>Full-time</b>	153,354	939,890	
<b>Part-time</b>	2,362	108,940	
<b>Total</b>	155,716	1,048,830	x 8
<b>Sub-degree courses</b>			
<b>Full time</b>	2,124	129,320	
<b>Part-time</b>	431	438,080	
<b>Total</b>	2,555	567,400	x 200
<b>Full-time Students</b>	98%	66%	
<b>Women Students</b>	28%	58%	
<b>Sub-Degree Students</b>	2%	30%	

Sources: UGC, (1969); HESA, (2005).

Many new programmes have been introduced. Some accord with the growth and expansion of academic disciplines (such as computer science, environmental science, sports science); some respond to new vocational demand (nursing, business and management studies); and some reflect cultural development (media and communication studies, design, women's studies). Many of these involve cross-disciplinary studies that do not conform to the pattern of the traditional subject specialist degrees; nor are they as dependent on pre-university preparation in secondary schools. And intentionally, many of the new courses are suitable for part-time study. One obvious consequence is that the great increase in student numbers is not distributed uniformly over all subject areas. In particular, the numbers of students studying the physical sciences, mathematics and engineering show much smaller increases (Table 2). While it is evident that fewer new programmes have been introduced in these areas to attract non-traditional students, a major cause of the relative decline lies in their dependency on provision in secondary education.<sup>5</sup>

<sup>5</sup> Even the apparent small increases in numbers of chemistry and physics students may be erroneous. In 1988-89, shortly before the polytechnics became universities, they enrolled 862 chemistry and 214 physics first-year students (CNA, 1990); in the same year the universities admitted 2986 chemistry and 2676 physics new entrants (UGC, 1991). The totals, 3848 and 2890 respectively exceed the figures (Table 2) for the combined university sector in 2003-04. Some of the polytechnic enrolments in 1988-89 will have been part-time students studying for the examinations of the then Royal Institute of Chemistry and Institute of Physics while employed in industry. This route to graduate membership of the institutions is no longer available.

**Table 2. First Year Full-time Undergraduates (First Degree Courses) (UK)**

Subject	1966/1967		2003/2004	
	Biology	1,258	2.4%	7,075
Chemistry	2,592	4.9%	3,315	1.0%
Physics	2,001	3.8%	2,840	0.8%
Mathematics	2,688	5.1%	5,480	1.6%
Engineering	9,283	17.6%	20,870	6.2%
All Students	52,756	100%	337,680	100%

Sources: UGC, (1969); HESA, (2005).

### Pre-University Factors: Secondary Education

Before the 1970s, the route to university lay through the ‘grammar schools’, selective secondary schools with academic educational programmes. To remove the social inequalities implicit in selection, this system has been progressively changed to one of non-selective, ‘comprehensive’ secondary schools. This has opened the way for many more pupils to obtain qualifications enabling them to enter higher education (though it has failed the expectation that it would remove the social imbalance of a preponderance of students in higher education from more affluent families). The social benefit of massified comprehensive secondary education has carried educational costs. Larger numbers, wider spreads of ability, and a pervasive youth culture increase the burdens on teachers: they contribute to a perception of lower academic standards in the schools. While great importance is attached by parents and government to success in examinations, opportunities for general education and education in depth are increasingly constrained.

For some subjects – notably the physical sciences and mathematics – the problems are even more acute. Four further limiting aspects can be seen.

- (a) They are unpopular by virtue of a reputation for being difficult and from a cultural attitude that identifies them as environmentally threatening.
- (b) They are expensive, which imposes restrictions on numbers and on the way they can be taught: practical laboratory work is dangerously extravagant.
- (c) There is a shortage of well-qualified teachers. Substantial minorities of specialist teachers of the sciences and mathematics have no degrees in these subjects<sup>6</sup> (Department for Education and Skills [DfES], 2006).
- (d) There is a gender barrier that constrains the number of girls electing to study mathematics and the physical sciences.<sup>7</sup> In biological sciences the number of boys is similarly constrained.

The consequence is that only school pupils who are both motivated and fortunate are likely to be able to pursue these subjects to the level of the school leaving examination (GCE A-level) and to

<sup>6</sup> Only 40% of mathematics teachers in non-private secondary schools have degrees in mathematics; for the sciences the figures are biology, 63%; chemistry, 75%; physics, 62% (DfES, 2000; 2006).

<sup>7</sup> Curiously, in recent years, the number of girls entering the GCE A-level examination in chemistry has equalled the number of boys; and they are more successful. The proportions of girls entering A-level examinations in other subjects are: mathematics, 40%; physics, 24%; biology, 63%; all subjects, 54% (DfES, 2003).

satisfy entry conditions for the universities.

The GCE A-level examination takes place at the completion of secondary education. Comparison of the results of the GCE A-level examinations for 1966/1967 and 2000/2001 reveals the extent of change. Reflecting the increase in numbers of pupils, entries for the examination have almost doubled. But while the proportion being examined in biology has remained constant, in the physical sciences and mathematics it has fallen dramatically. Moreover, the proportions of those being examined and gaining the so-called “good grades” (A–C) has also doubled. These are the grades normally considered appropriate for entry to specialized university courses. The proportion achieving these grades now is similar to the proportions achieving grades A-E 35 years ago. Interpreting these dramatic changes is not simple: the syllabuses and structures of the examinations have changed over time. A large perturbation derives from a politically inspired shift from normative to criterion-based determination of grades. Consequently, some argue that the greater success rates – which increase year by year – and greater proportions of high grades reflect more dedicated study by pupils and more effective teaching; others see the results as indicating a ‘dumbing-down’ of the examinations through relaxed syllabuses and lowered standards. Concern about standards and attainments – in universities as well as at school – is regularly expressed by employers in industry and commerce and by professional bodies.

**Table 3. GCE A-Level Entries and Results (UK)**

Subject	Entries	1966/1967			
		Grades A-C		Passes	
		Grades A-C	%	Grades A-E	%
<b>Biology</b>	31,800	10,600	33%	21,200	67%
<b>Chemistry</b>	40,500	13,800	34%	27,900	69%
<b>Physics</b>	54,500	17,800	33%	36,900	68%
<b>Mathematics</b>	69,700	23,300	34%	46,300	66%
<b>All Entries</b>	490,000	165,600	34%	335,600	69%
2001/2002					
<b>Biology</b>	60,600	37,600	62%	54,500	90%
<b>Chemistry</b>	45,700	32,400	71%	42,500	93%
<b>Physics</b>	40,400	27,500	68%	37,200	92%
<b>Mathematics</b>	73,400	52,800	72%	65,300	89%
<b>All Entries</b>	871,700	584,000	67%	828,000	95%

Sources: DES, (1968); DfES, (2003).

Notes: (i) Percentages calculated as proportions of entries.

(ii) Figures for 1966/1967 estimated for UK from published data for E & W.

### **External Factors: Employers and the Professions**

Concern about the attainments of graduates is endemic in employers. In part it arises from doubts concerning the commercial benefits of academic values. But accompanying the expansion of higher education, it was largely based on suspicions of new courses and new institutions. At a time when governments were emphasising the economic significance of expansion, these concerns contributed to a number of significant developments: they persuaded universities of the need to respond to the opinions of business and commerce; they elevated the employability of graduates to become highly

visible performance indicators; and they catalysed governmental initiatives for making quality assurance part of accountability.

In the UK there is a lengthy history of close relations between Faculties of Science and Engineering and industry. Establishment in the nineteenth century of these Faculties and of the then new civic universities was largely due to pressure from leaders of industry; and implementation of these Faculties' research culture derives from the influence of industry in the 1920s. One consequence has been development of a mutually beneficial relationship between the universities and the professions. Completion of an accredited degree course in the various branches of engineering, chemistry and physics leads automatically to eligibility for graduate membership of the appropriate professional body: by completion of a period of qualified experience, full membership is subsequently attained.

To obtain this status, the degree courses in each university are scrutinised by the appropriate professional Institution. Through their universities, departments seek accreditation of their courses; the professional scientific and engineering Institutions examine the structure and content of the degree courses, their university and departmental facilities and their academic standards. To do so, the Institutions appoint representatives to assess the teaching and research work of departments, often involving visits to advise and discuss proposals, particularly with new departments or those offering novel courses. In general these procedures are not seen to raise any problems of infringement of academic freedom; rather they are viewed as opportunities for constructive exchanges between the academic and professional communities.<sup>8</sup>

Graduates of professionally accredited courses are not exempt from the generic criticisms of employers: poor written and oral communication abilities, limited experience of collaborative effort, and little awareness of routine demands of employment. But, in common with graduates of other traditional degree courses, they are both more employable and command substantially higher starting salaries than those from many of the new non-traditional and sub-degree courses. Moreover, the overall levels of earnings of physical scientists and engineers remain relatively high, with private rates of return (at 15%) higher than those for all other graduates except those in law and management studies (PricewaterhouseCoopers, 2005).<sup>9</sup>

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<sup>8</sup> The process is in large part an academic exercise. A significant proportion of the Institutional committees will be senior academics from other universities. Consequently, academic departments see the process as offering a threefold benefit: (1) it provides an opportunity to enlighten the profession about evolving educational developments; (2) it yields a valuable mark of peer and professional approval; and (3) it provides a department with useful arguments to support claims for internal allocation of university resources – no university would be prepared to see accreditation refused. Over time, similar processes for accreditation of courses have come to operate in many other traditional professions e.g. accountancy, architecture, education, law, medicine, pharmacy, nursing.

<sup>9</sup> Rates of private return from lifetime earnings are given as: law, 17.2%; management, 16.9%; engineering, 15.5%; chemistry, 15%; physics, 14.9%; foreign languages, 14%; social sciences, 13.5%; medicine, 11.6%; biology, 10.2%; psychology, 10.1%; English, 9.7%; history, 8.8%; all degree graduates, 12.1% (PricewaterhouseCoopers, 2005).

## Science and Engineering in UK Universities

The decisions to expand provision of and access to higher education in the 1960s carried expectations that they would lead to economic growth. One explicit component was an ability to meet the economic requirements for scientists and technologists (see *e.g.* Robbins, 1963; Department of Education and Skills [DES], 1972; University Grants committee [UGC], 1984a). Urgency in establishing the polytechnics was due to the perceived inability of the existing universities to meet this demand. The polytechnics, many based on the larger regional technical colleges, were intended to fill a need for vocationally oriented courses in applied science and engineering. In achieving the expected growth the polytechnics were hugely successful – but to do so they responded to the student market force for courses in the social sciences not science and technology.

Over the past 40 years, the statistics indicate that numbers of science students in the universities have indeed increased (Table 2). In the basic physical sciences, chemistry and physics, in mathematics and engineering they have doubled. But these increases are smaller than of the numbers of universities, and far smaller than the overall numbers of students. It is therefore hardly surprising that, within the universities, there has been concern about the future of provision in these subject areas. There are conflicting arguments. On the one hand their ability to attract students is limited, yet their graduates are in high demand by employers and command high salaries; they are inherently expensive subjects, yet they continue to attract unprecedented levels of funding and support for development; they are fundamental, enabling, academic disciplines, yet sustaining them deprives other popular areas of resources and facilities.

Across the UK system of higher education the conclusions drawn from these arguments are clear. First and most obvious is that limited numbers of students implies limited numbers of departments. Departments of chemistry, physics and engineering have been closed. Accompanying the closures have been some counter-intuitive developments in those universities that have retained departments. In contrast to a general trend towards shorter, less rigorous undergraduate courses, the undergraduate courses in the surviving physical science and engineering departments have been lengthened and made more demanding. Further, some indication of the status of these subjects is provided by the nature of the universities in which the courses have been retained.

*Closure of Departments* From a situation in the 1960s, when departments of chemistry and physics were considered essential in all new (as well as existing) universities, they are now found in less than one-third of UK universities. Similarly, while in the past all major universities aspired to develop full Faculties of Engineering, their recent history has been one of closure of departments for the separate engineering disciplines and their replacement by smaller departments of general engineering. This decrease in provision for the basic physical and engineering sciences may well reflect the needs of a post-industrial society or at least the declining significance of manufacturing industry. Even so many of the same fundamental enabling skills are required in the new developments,

notably in biochemistry, computer science, and environmental science, which have rapidly expanded in response to evident needs.

To the extent that both the old and new departments compete for the same scarce resources there are problems for universities. Both seek to recruit undergraduates from the same finite pool of limited numbers of secondary school students qualified for admission to Faculties of Science and Engineering, that is, those with good A-level results in chemistry, physics and mathematics. In fact, enrolment of students with A-level grades D and E are now commonplace in the less prestigious universities, leading these Faculties to have significantly lower average entry scores than almost any other Faculties (University Statistical Record [USR], 1991).<sup>10</sup>

There is also direct competition for university resources. It is not just the newly expanding areas that incur additional costs, the physical and engineering sciences are also rapidly developing subjects. Whereas in the past chemistry and physics could have been taught and practised as 'small' sciences, this is no longer true. Their subject matter is more extensive and diverse; not merely is there more to be learned, the range of specialisms, techniques and expertise is greatly enlarged. They are also bigger in costs: the capital costs of equipment and facilities; the operating costs of consumables and staffing. No longer can full programmes of the physical sciences and engineering be accommodated in small departments.

**Figure1. Undergraduate Teaching Load and Academic Staff Numbers: Chemistry**

Total ug Student Load: 13,200		Funded Academic Staff 880	
Student/Staff ratio <sup>1</sup> :		15:1	
(a) Assume 100 departments		(b) Assume 30 departments	
Student Load average	132	Student Load average	440
Academic Staff average	9	Academic Staff average	29
( <sup>1</sup> Existing s/s ratio. Assumes weightings p-t students 0.5, pg students 2)			

When the arguments about student numbers and costs are combined they generate a powerful logic (Figure 1). If, for example, the current total number of chemistry students were to be distributed over all the (approximately) 100 universities, this would give an average total enrolment of 130 students.<sup>11</sup> With an existing student/staff ratio of 15: 1 this would correspond to a total academic staff of 9. Such a department would be properly perceived to be too small either to cover a professionally adequate syllabus or to justify the necessary capital costs. Moreover, a non-prestigious university could attract even this average number only by enrolling students with less than good A-level grades. With these less well-prepared students its teaching burden would be increased and several of its important

<sup>10</sup> The only Faculty with a lower average entry score is Education.

<sup>11</sup> For simplicity it is assumed that the teaching 'load' in chemistry for students from other departments balances the load transferred to other departments by chemistry students taking courses elsewhere. Historically, chemistry, physics and mathematics departments were net importers of teaching load. In recent years, new subject areas have increasingly undertaken responsibility for teaching their own basic science and mathematics.

'performance indicators' would be weakened. Further, by application of the "Matthew Principle", it would be unlikely to be able to attract or retain even an average number of graduate students or to obtain significant research funding. Inevitably, the university would see advantage in redirecting its block-grant resources to areas of high student demand and potential growth. An alternative scenario (Figure 1) of concentrating students in a much smaller number of departments gives figures that offer a more persuasive basis academically, financially and managerially. It appears that the internal market within universities is adopting this course, not just for chemistry but for physics and engineering also. In the past 10 years some 28 chemistry and a similar number of physics departments have closed; and in engineering, closures have been accompanied by mergers of electrical, mechanical and civil engineering departments into general engineering departments.

*First Degree Courses* Establishment of mass higher education has required significant modifications to university courses – indeed this might be construed as a criterion of mass higher education. With the aim of accommodating "non-traditional" students and attitudes, a variety of new, shorter sub-degree courses, and new formulations and new prescriptions for degree courses has become available. In public debates in Europe, these changes are regularly presented as timely changes to an increasingly irrelevant, rigid and outdated structure; or alternatively as evidence of degraded university standards, and as dumbing-down of courses to justify targets for expansion. Probably both views contain elements of truth.

In these circumstances, a decision to implement longer and more rigorous first-degree courses might appear to be foolish. Yet this is precisely what has happened over the past 15 years in engineering, mathematics, physics and chemistry. It is not though entirely perverse. In these subject areas there is little or no evidence that actual or potential students have non-traditional attitudes or aspirations. The physical science and engineering departments offer few sub-degree courses; and the emergence and growth of new subject specialisms is reflected in creation of new degree courses. So the driving force for change has focussed on the need to sustain the relevance and effectiveness of the existing traditional courses. Three aspects of this driving force can be identified.

- (a) Limitations imposed by the scope and standards of the GCE A-level syllabus and teaching resources in secondary schools means an increasing proportion of students requires longer introductory courses.
- (b) Scientific developments have increased not only the extent of knowledge but also the range of relevant knowledge. To meet professional standards and the requirements of industry this implies that time is needed to accommodate the greater diversity of material.
- (c) Both academic departments and the scientific professions emphasise a greater significance for research capabilities. In UK universities this is partly a reflection of the financial benefits flowing from the research assessment exercises; in the UK scientific and



engineering industries it reflects the decline of requirements for bulk manufacturing and the demand for new products, processes and technology.

**Table 4. First year Full-Time Undergraduates (First-Degree Courses) (GB) Expected Length of Course**

Subject	1983/1984		2003/2004		
	3-year course	4-year course	3-year course	4-year course	Sandwich courses
Pharmacy	524	147	613	2,049	232
Biochemistry	865	196	1,348	554	268
Chemistry	2,006	415	1,245	1,992	428
Physics	2,393	299	913	1,860	95
Mathematics	4,043	633	3,200	2,187	267
Chemical Engineering	374	442	141	540	122
Engineering (all)	6,994	3,970	8,827	11,473	3,774

Sources: UGC, (1984b); HESA, (2005).

Notes: Figures for 4-year courses 1983/1984 correspond to the numbers of students following 'sandwich' courses, which provide the equivalent of one year's industrial experience during the undergraduate course. For 2003/2004 the numbers of 4-year course students include sandwich course students; for clarity the numbers of 'sandwich' students are listed separately in the final column of the table.

A 4-year 'enhanced' degree in pharmacy (MPharm) has been introduced.

The possibility of modifying undergraduate courses in response to the evident constraints and limitations imposed by the changing environment of secondary education was not adopted. A complementary development, of strengthening and expanding provision of postgraduate masters courses in order to achieve the necessary professional criteria, was proposed by government but not supported by the professional bodies or industry; it was rejected by the universities largely through fears that it would downgrade the existing 3-year degrees and further reduce enrolments. The universities response has been to introduce a 4-year first-degree course that carries a misleading title of MSci or MEng (or sometimes MPhys or MChem and not to be confused with the postgraduate masters degree of MSc).<sup>12</sup> The new courses run in parallel with the existing 3-year courses, commonly sharing the first and second years. The third year of the new courses allows more advanced material to be included and combined with in-depth study of selected options. A research project occupies a substantial part of the time in the fourth year.

These new 'enhanced first degree' courses attract an increasing proportion of students (Table 4). By 2003, over half of all chemistry students were enrolled in 4-year courses. For those students with firm professional ambitions this is clearly a prudent decision. The Royal Society of Chemistry indicates that that an MChem degree will eventually become a necessary precursor for registration as a Chartered chemist (CChem). It was initially proposed that completion of an enhanced first degree should be a requirement for enrolment for a PhD (students with a conventional 3-year BSc this would have required a postgraduate MSc degree). In the event this has not occurred.

Two universities, Oxford and Cambridge, offer only enhanced 4-year courses. At Oxford this is simply a relabelling of the 4-year degree that was established uniquely there more than 50 years ago.

<sup>12</sup> Evident problems in seeking recognition of the 'enhanced' degrees as 'second cycle' (*i.e.* postgraduate) qualifications under the Bologna agreement have yet to be resolved.

Conversely, a substantial minority, one-third of the universities still offering degree courses in chemistry, have not introduced 4-year enhanced degrees. In this group are universities with small departments of chemistry where neither the resources nor numbers of students are sufficient to allow parallel courses. It appears likely that those departments, unable to sustain the enhanced courses, will find it increasingly difficult to survive. It must be expected that chemistry, physics and engineering courses will continue the process of concentration in larger departments in the more prestigious universities, and of closures in the others.

### **Consequences, Reactions and Conclusions**

A crisis in provision for science and engineering in the universities has been widely perceived. Media, politicians, learned societies, employers, and academics all express concern and urge corrective action. Yet analysis of the existing situation suggests that, for the higher education system, far from there being a crisis there appear to be clear indications of success. The perceived problems arise, in part, from an innate academic reluctance to change; and in part from inability to recognize the diversity of consequences: within the higher education system these appear as differing academic, educational, and institutional effects.

*Academic Effects* There is no doubt that currently physical sciences and engineering in UK universities are healthy and strong. Their research is of high quality and in identifiable areas they provide world leadership. They receive substantial financial support from industry, government and a wide range of agencies; and they attract large numbers of overseas graduate students and post-doctoral researchers to sustain their programmes. The surviving – and now increasingly large – departments are able to provide high quality courses that satisfy professional requirements and to maintain their undergraduate recruitment, mainly with talented and well-prepared students. More than half of these undergraduate students study the ‘enhanced’ 4-year courses that equip them for careers in research, either in the universities themselves or in industry. Employers indicate the value they place upon the graduates through high salaries and excellent career prospects, with supply of and demand for graduates being well-balanced.

*Educational Effects* Concern about the numbers of students enrolled in chemistry, physics and engineering departments at the universities is due to their relative decline as a proportion of total numbers (Table 2). This change is real but does not reflect the total numbers of students currently studying these subjects in the universities. Evolution and development of the sciences and engineering has led to transformation of minor or optional special subjects into major new disciplines: biophysical sciences, computer science, environmental science. Enrolment in the degree courses now available in these new and expanded areas is substantial (Table 5). One consequence is that mathematics, chemistry and physics, as fundamental enabling subjects, are now widely taught as essential elements of these disciplines. If chemistry is taken as an example of the areas listed in Table 5, it is central to

the study of pharmacy, biochemistry, environmental science, forensic science, geology, and materials science: together these expanding subject areas show a 9-fold increase in enrolments over a period of 40 years. Study of chemistry within these courses constitutes a necessary part of their professional as well as academic requirements. The areas of chemistry integrated into these courses are commonly taught within their new departments by specialist academic staff, in many cases relocated from now extinct departments of chemistry. A combination of student numbers and of previously interdisciplinary teaching enables many universities to sustain courses within large new departments offering these popular subject areas. One consequence is that this provides continuing local access to university courses that previously could have been met only through degree courses in the physical sciences or engineering.

**Table 5. First Year Full-Time Undergraduates (First-degree Courses) (UK)**

Subjects	1966/1967	2003/2004
<b>Medicine (pre-clinical)</b>	2,830	6,115
<b>Pharmacy</b>	542	2,735
<b>Biochemistry</b>	297	1,955
<b>Chemistry</b>	2,552	3,315
<b>Materials science</b>	-	70
<b>Physics</b>	2,001	2,840
<b>Geology</b>	212	1,470
<b>Environmental science<sup>1</sup></b>	3	2,160
<b>Forensic science<sup>2</sup></b>	-	685
<b>Mathematics</b>	2,688	5,480
<b>Chemical Engineering</b>	807	700
<b>Engineering (other)</b>	8,476	23,860
<b>Computer Science</b>	-	16,815

Sources: UGC, (1969); HESA, (2005).

Notes: Discrete figures for environmental and forensic science are not reported for 2003/2004. Numbers are estimated from data for earlier years.

*Institutional Effects* The effects on universities fall into two groups: for both groups the consequences clarify the role to be played by individual universities in the system of higher education, though within one group the process has not been without anguish.

The smaller group comprises the major research universities, in which the physical sciences and engineering continue to be important components. These universities well-illustrate the pattern identified by Trow (1984). Their large and successful research programmes obtain substantial external funding and enable them to attract and appoint distinguished and successful scholars from elsewhere in the UK and overseas. Within the universities, increased resources and facilities entail a responsibility to expand enrolment at both graduate and undergraduate levels: their reputations ensure that they can be selective at both levels in enrolling students who are talented and well qualified. Their graduates are well educated, professionally competent and able to contribute to sustaining the high reputation of the university and of its departments.

The second, larger group presents the obverse situation. These universities, with either little or no tradition of research or able to pursue only small scale research programmes, lack the resources, facilities and successes that yield significant external funding and the prestige and reputation that this confers. For the physical sciences and engineering, a combination of high costs and limited student recruitment weakens their internal competitiveness for university resources. In expanding institutions, an inability to justify growth has led in many instances to departmental closures or mergers: to create composite departments of general engineering or components in the expanding provision for teaching in life, environmental, or materials sciences.

A resultant identification of a group of research universities, in character distinct from the larger group of other universities, is not unexpected (Trow, 1984). What is less expected is that a criterion for recognition as a major research university is to provide teaching as well as research in the physical sciences, chemistry and physics, and in engineering. In the UK university system an additional dimension is also possible. The major research universities retain many of the structural characteristics of traditional 'elite' institutions: in particular they retain the specialized single subject undergraduate degrees.<sup>13</sup> Moreover it is the graduates from these traditional degree courses who fill the continuing demand from the established professions: medicine, physical science, engineering, law, and education, and at graduate level, business and administration. While these disciplines are taught at many universities - in the less prestigious universities often as components of other vocational courses - entry to the professions is dominated by graduates of the research universities. But perhaps uniquely it does appear that, at a professional level, chemistry, physics and engineering constitute such traditionally elite subjects that they can only be taught in a traditional, elite research environment.

*Concerns for the Future* The academic, educational, and institutional developments have contributed to a series of significant positive achievements. From its own analysis of the situation, the Higher Education Funding Council for England (HEFCE) concluded that there was no need to identify chemistry, physics, and mathematics as "strategic subjects in crisis", though it undertook to keep the matter under review (HEFCE, 2005). To this extent at least the expressions of public concern about the current situation can be seen to have been largely misdirected. But there are some identifiable pragmatic issues that do need to be addressed.

The most immediately evident of these is educational. Of the 170,000 teachers of science and mathematics in the non-private schools in England, 43% (73,000) will reach retirement age over the next 10 years (DfES, 2000). The proportion is not uniquely high for science and mathematics but the

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<sup>13</sup> In this context the word "elite" is not used with its familiar social sciences implication of selection by privilege of influence, birth, wealth, or family. Rather it is used in its normal dictionary (OED) sense of selection of those best suited by ability to pursue academic education. This, it may be seen, accords with the familiar criterion adopted in the Robbins (1963) report that "higher education should be available for all those who are qualified by ability and attainment to pursue it and who wish to do so". It may be noted that the introduction of mass secondary and higher education has coincided with a reduction in social mobility in the UK (Matheson & Pullinger, 1999).

problem of their replacement is and has been publicly identified by the Royal Society and the professional scientific societies (see *e.g.* Royal Society for Chemistry [RSC], 2006). Replacing these teachers would, numerically, require a continuing annual recruitment of about 10% of all new science and mathematics graduates, far in excess of the current level, and to jobs that offer less attractive pay and conditions than those available elsewhere. Failure to replace them, or their replacement by less qualified teachers (see footnote 6) will inevitably further reduce the student demand for enrolment in degree courses in science, mathematics, computing and engineering.

Concerns also arise within the universities. Student demand for science and engineering courses may well be affected by increases in tuition fees. Introduction of higher fees (2006) must be expected to constrain growth of undergraduate enrolment in the 4-year 'enhanced' degree courses in relation to the normal 3-year courses despite estimates that the higher fees will not reduce the rate of return to graduates (PricewaterhouseCoopers, 2005). Predictions that even the higher fees will do little to redress perennial underfunding of the universities, strengthen arguments for introduction of differential fees for higher cost courses. Such further increases would inevitably impinge on enrolments in all courses in science and engineering.

Uncertainty in regard to economic issues also raises concern. The relative decline of physical science and engineering students over the past 40 years coincided with an actual reduction in the scale of manufacturing industry. Moreover, industrial and commercial developments over this period, which have resulted in the current highly productive and profitable sector (Chemical Industries Association [CIA], 2005), have been research-driven. This is entirely in accord with the aims and objectives of the 4-year 'enhanced' degrees and with the growth of research activity in the physical sciences and engineering. Inability to maintain the stream of postgraduate research students, either from the enhanced undergraduate degrees or from elsewhere, could seriously impair university research programmes. Recruitment of overseas research students, who currently constitute one-third of the total, is challenged by increased competition from graduate schools in Australia, China, and Europe as well as in the USA. At present, access and proximity to the research and the graduates from the leading universities constitutes a major factor in determining the location of commercial research activity. Failure to sustain the quality and quantity of university outputs would tend to increase the possibility for industrial and commercial research to follow manufacturing industry overseas in pursuit of lower costs and higher profits.

*And a Curious Case of a Lack of Concern* The analyses presented above have identified the remarkable success with which the surviving departments of physical science and engineering have responded to change in professional requirements over the past half century. Their successes in both teaching and research have provided a large element of the esteem that the universities enjoy through their contributions to economic growth and development. More generally, the whole higher education system has also achieved success in adjusting to the demands of a mass higher education system in

which participation has risen from less than 10% to over 40%. Yet separating these two achievements is an unfilled gap: the absence of any significant mass higher education in science.

The dominant characteristics of the changes accompanying establishment of mass higher education in the UK can be cryptically summarised as explosion of numbers, non-traditional students, part-time study, and sub-degree level courses. In large part these characteristics derive from the limitations on schools imposed by mass secondary education. Teaching in the sciences and mathematics has been most seriously affected by these limitations. Even so, it is in just these areas that university courses have shown least modification: indeed none of the identified characteristics of massification are evident in the schedules offered by Faculties of Science or Engineering.

A lack of such adjustment in the prestigious research universities is not unexpected. Across their Faculties there have been relatively few and small changes consequent on massification. Their function within the higher education system is to sustain a flow of traditional, elite graduates and research to satisfy the continuing requirements of society and the economy for these products. Elsewhere in the UK system, the role required of higher education is now far wider than educating well-prepared students for specialist degrees and conducting research. To fulfil its vocational and educational objectives, higher education has also to remedy the deficiencies of provision in secondary education. This is impeded by a persistent belief that the sole function of science in higher education is to train professional scientists. Two factors contribute to sustaining this belief. One is an emphasis by government on provision of vocationally orientated courses that yield graduates to fill the needs of employment; the other is a cultural aspiration across the UK academic community to achieve the esteem enjoyed by the prestigious research universities.

The UK university system is configured as a lofty pyramid, with many institutions and more academic staff aspiring to places at the apex (Clark, 1983). This contrasts with that in the USA where the pyramid is flatter and is also identifiably stratified: in its institutionally competitive environment, aspiration focuses on becoming “best among equals” (Clark, 2005). In the UK, the alternative to attaining a place at the apex is to be stigmatized as ‘second class.’ The failure to accept institutional differentiation as an opportunity to achieve excellence implies inadequate appreciation of the range of functions now required of higher education. In particular, it inhibits responses to the need for provision of education – in contrast to training – in the sciences.

The inadequacy of science provision in the secondary schools and its absence from all but professional programmes in universities is a curious gap in educational policy. Although the national curriculum for schools has science as a compulsory component, the results are not commensurate with the needs of a technologically advanced and information-based society. The need for improved science literacy is evident in the ill-informed and misdirected media and political comment engaging public concern. Although the use of higher education to remedy this deficiency would be expensive and inefficient, it could prove practical and effective. Two specific objectives can be identified. First a programme explicitly to remedy general defects in science literacy: this might take the form of a

two-year diploma or two-year “Foundation degree.” Second, a degree programme aiming to supply government, business and commerce with graduates educated in scientific and statistical methods and analysis and equipped with literary and verbal communication skills. It is regularly noted that many employers value science and engineering graduates, not for their advanced laboratory skills or specialist knowledge, but rather for their generic problem-solving and analytical skills. In the distant past a schedule such as that of the defunct ‘general science degree’ could have been developed to fill this role. More appropriately now perhaps a new ‘Science Greats’ could be established that would prove both timely and appropriate to needs.<sup>14</sup> It is not clear though whether such a course could be located better in Faculties of Science or in Business Schools.<sup>15</sup>

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<sup>14</sup> ‘Greats’ was the designation in the nineteenth century of the final examination of studies for degrees in classical history and philosophy at Oxford University. In the nineteenth century, this was deemed an appropriate educational preparation for employment in government in the home and overseas civil services. In the twentieth century, a new course was created. ‘Modern Greats’ or PPE (philosophy, politics and economics) was introduced in response to a need in government and commerce for people educated in the social sciences. ‘Science Greats’ might well constitute the final two years of a course starting with the Foundation degree and including study of science and scientific method, statistical inference, information technology and logic, and communication skills.

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## Trends in American Undergraduate Higher Education

Arthur K. Ellis\*

### Introduction

The 21<sup>st</sup> century curriculum of American undergraduate higher education bears little resemblance to its early forbears. From the establishment in 1636 of Harvard College, America's first institution of higher learning, through the middle of the 19<sup>th</sup> century, universities were, with a few notable exceptions (*e.g.*, the University of Virginia, chartered in 1819), private, religious-based institutions focused on instructing small numbers of elite students mainly in classical subjects such as history, literature, mathematics, languages, and philosophy. It is safe to say that greater emphasis for both faculty and students was on scholarship than on research. Education was dominated by text and lecture, reading and writing. Empirical research by professors, not to mention students, was rare, and the curriculum was one of broadly-based liberal studies.

The emergence of the modern research-oriented secular university in the United States occurred in the latter half of the 19<sup>th</sup> century, at which time many new universities were founded and most existing universities began the slow but sure shift toward building graduate research schools and facilities. Schools retained their undergraduate collegiate teaching function, but a process of relegating it to a far less dominant position was set in motion. Johns Hopkins (1867), based on the German secular research university model, was the first such, emphasizing graduate studies and research over collegiate instruction. In this same time period, the Morrill (1862) and Hatch Acts (1887) enacted by the U.S. Congress established the precedent for state universities, particularly what were known as Land Grant universities that offered specializations of research in agriculture, engineering, and other subjects deemed essential to the national welfare. Such legislation by the Congress made possible a rapid proliferation of state colleges and universities with a host of new "majors" or major courses of study based in research-oriented specific disciplines (also referred to as academic departments) that served as an organizing tool for higher education. The new emphasis on research as opposed to general scholarship and undergraduate instruction created a need for scientific researchers in particular disciplines, thus bringing about a sea change in the role of the professorship from liberally educated polymath to specialized scientific researcher. The prestige accorded the research function and the professors who spent more time and energy conducting research than teaching introduced a status hierarchy previously nonexistent in university faculty life.

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The rise of the research function and its corollary, the discipline-specific major course of study to be pursued by each student, had changed university education in the most fundamental way. No longer was the central focus of an undergraduate student's academic life devoted to general scholarship and liberal studies. To the extent that this purpose was still served, liberal studies now functioned as prelude to a student's special subject area of interest, rather than as an end in itself. The answer to the question, "what's your major?" became a means of self identification for undergraduate students. To be sure, there were those who lamented this change and who made sincere attempts to bring about some balance between liberal and discipline-specific studies, but the research function was here to stay.

By mid-century, in the wake of World War II, higher education enrollment numbers increased substantially bringing a new type of student to the university, one with a more pragmatic view of the purpose and value of a college education. Increasingly, students from the lower middle class and middle class, young people who in an earlier age would not have thought of higher education as something to which they might realistically aspire, were coming to study at colleges and universities, bringing with them a sense that, among other things, a university education would surely lead to a wealthier, more comfortable life based on a better career. High profile universities were increasingly becoming research-oriented institutions, filling faculty positions with discipline-specific researchers, and undergraduate education came more and more to be made up of a collection of courses taught by specialists, with liberal studies occupying much of a student's first year mainly as backcloth to a clear academic goal of getting to the point in which he or she could focus on a far narrower set of courses, the major, leading to career.

This pragmatic sense of purpose with its focus on career preparation to the detriment of liberal studies as the essence of a university education was viewed, perhaps not so much by students, but by certain academic leaders with alarm. Specialized technical proficiency is one thing, education for the good life is yet another, or so the thinking went. A growing concern was that education had been traded for training, a poor bargain indeed in a democratic society. Many universities began a process that continues to this day to attempt to recapture the lost emphasis on a broad, more general undergraduate curriculum. Harvard University, through the publication of its famous *Red Book* (1945), sounded a clarion call, advancing the argument that any educated undergraduate student must be conversant with the broad intellectual and cultural components of Western civilization.

Reflecting on the impact of the *Red Book*, former Harvard President Richard Lanham wrote about the work of President James B. Conant, who commissioned it, and the committee that began its work in 1943:

"The committee saw itself as inheriting an educational revolution in popular schooling. In moving from an agricultural to an industrial economy, America had increased its high school population ninety-fold. In 1945, when the committee issued its report, American

higher education was about to institute a similar revolution; to welcome students of different kinds, and in much greater numbers, than it had ever before; to extend its curriculum into uncharted ground; and to expand its research task, and the financing thereof, in ways that would transform the institution” (1997, [www.rhetoricainc.com/harvard](http://www.rhetoricainc.com/harvard), p. 1).

Conant himself had charged the committee with the responsibility of restoring balance of purpose in the undergraduate curriculum, writing, “The primary concern...is the infusion of the liberal and humane tradition into our entire educational system. Our purpose is to cultivate in the largest possible number of our future citizens an appreciation of both the responsibilities and the benefits which come to them because they are Americans and are free.” Such a statement is hardly a brief for discipline-specific narrow career preparation.

The 1960’s and 70’s brought additional modifications to the undergraduate curriculum. During a time of social tensions related to the Vietnam War, Women’s Movement, Cold War, War on Poverty, and Civil Rights Movement, universities increasingly recognized a need to prepare students for a broader, more inclusive world view, including knowledge of the contributions of Eastern cultures, minorities, women, and other previously largely ignored groups. Even among those who favored a liberal studies emphasis, the culture wars of this period had created a schism between what Lanham termed “the Politically Correct Books Left” and the “Great Books Right.” Meanwhile, with most students at most universities actively seeking out a professional or academic major course of study, the question became, what exactly constitutes the essence of a university education? The dominant reaction to all this was not so much a retreat from an emphasis on discipline-specific studies but the attempt by school after to school to identify a set of core classes, essentially liberal arts classes, that all students should take in common regardless of their major course of study.

It was clear that two somewhat conflicting ideas of what constitutes a proper university education had taken hold: 1) a recognition that too much knowledge exists for any one human being to even consider taking it all in, thus the major or indepth course of study needed to prepare people for careers in an increasingly specialized and technically demanding world of work, and 2) a recognition that education at its best is more than career preparation and thus the need to experience a broadly conceived liberal arts foundation that emphasized critical thinking, connectedness, great ideas that have shaped the world, and the obligations to society that come with a higher education. The task of the university was to ensure that these two themes are compatible.

At the same time, universities, especially those thought of as national in scope, that is, institutions prominent enough to draw serious students from around the nation and the world, had become increasingly focused on research and development. It is worth noting that these national universities in the United States dominate any list of the world’s most prestigious universities, and that their reputations rest largely on research published, patents awarded, and funds generated through

endowments and research grants, and less so on commitment to undergraduate liberal education. Thus in spite of the many reports calling for a renewed emphasis on liberal studies, a change of mission priority had taken place from undergraduate liberal education as cornerstone to the expansion of graduate studies and the demands made on faculty members to attract funds, to conduct research, and to publish. One of the most obvious effects of this was the attraction of the best and the brightest in the professorial ranks to research-oriented institutions where undergraduate teaching and advising were not necessarily the first order of business. The corollary to this has been the proliferation of research-based, discipline-specific courses and majors in the undergraduate curriculum, further diminishing the role of liberal studies as an integral part of a student's course of study.

Apart from the relative handful of colleges (*e.g.*, Reed College, St. Johns College, University of Chicago, Brown University) that cling in different ways to the broad liberal arts tradition with a primary emphasis on teaching and advising, the current reality of most undergraduate programs is that of clearly defined major courses of study, driven by a research agenda, one based on the expectation and requirement of most university faculty members to conduct research and to publish their findings in juried journals and other scientific forums. As one might expect, research-oriented universities cater far more to the day-to-day demands of the research mission and to advanced discipline-specific studies than they do to the agenda that advocates of liberal studies for undergraduates think is so needed. The irony is that the prestige accorded to universities with famous graduate programs makes those institutions attractive to undergraduate students who often mistakenly think they will receive a better education at such schools.

Just as the worldwide proliferation of McDonalds and other fast food establishments has created such by products as cheap leather goods (after all, if you kill millions of cows for hamburger meat, you are left with the hides), so has the shift to a focus on academic research in American institutions of higher education created a by product of research-oriented graduate students, often not the cream of the teaching crop because they are themselves doing full-time study and research, left to teach undergraduates who many continue to think desperately need a general liberal education guided by professors who value collegiate instruction as a first order or responsibility.

Since the passage of the Bayh-Dole Act, or technology transfer law, by the U. S. Congress in 1980, the number of patents that have been issued to American universities has increased from under 250 to over 3,600 per year (Society for College and University Planning, 2005). The vast majority of funds supporting the research conducted that leads to these patents have as their source the U.S. government. Many of these patents in turn greatly increase yearly revenues for the institutions that are fortunate enough to receive them. The monetary reward gained from patent issuance consequently feeds the growing focus on academic research at many universities across the nation. However, at what cost to undergraduate education?

In 781 the Emperor Charlemagne brought the English churchman and scholar Alcuin to the Palatine School in Aachen, Germany, where he introduced the traditions of Anglo-Saxon humanism to

continental Europe. Alcuin's assignment, among other things, was to teach the entire curriculum. He was a polymath in the truest sense of the word, a man who knew seemingly everything worth knowing. He taught grammar, logic, and rhetoric, the trivium. He also taught geometry, music, arithmetic, and logic, the quadrivium. He took it upon himself to encourage the study of the liberal arts toward the better understanding of spiritual doctrine and the meaning of life. That was then, this is now, when a common comment by American university professors if asked about this or that, is "that is out of my field," or words to that effect, meaning "I know my narrow discipline but do not pretend to have knowledge in any depth beyond that."

The exponential growth of the knowledge base in academic disciplines has been such that each discipline, for example, biology, physics, history, mathematics, has given birth to specialized branches the mastery of which takes years of study. Beyond this, the rise of professional studies in the form of undergraduate majors, for example, accounting, business, engineering, has in turn led to sub-specializations that have themselves become major courses of study. The question, beyond the liberal arts/major debate, of what stays in and what is left out of a four-year undergraduate curriculum is not easily answered. The sheer volume of knowledge accumulated by each professional discipline each day is overwhelming. No one is in a position to claim expertise in a whole discipline given the rise of entire areas of inquiry within disciplines.

One answer is to delay much of discipline-specific and professional education, placing it within the structure of graduate studies, in much the same way that law and medicine presently do.

Advocates of the liberal arts tradition argue that anything less than a liberal education is merely training, not education in the sense of the development of the well-rounded individual. Further, they argue that a liberal education is indeed the best preparation for a changing world in which an unknown future will more than likely render much of what currently passes as narrow job preparation obsolete in the long term. On the other hand, they maintain, cultural literacy, problem solving skills, and a sense of obligation to society will serve people well regardless of changing circumstance. To this end, most universities have reaffirmed their commitment to the common core of subjects, that is, those subjects required of any student seeking a university degree, regardless of major. Today's common core is rather different from the classical curriculum of the 19<sup>th</sup> Century which required Latin and Greek among other subjects, but it does reflect a similar commitment to the development of general education as foundational in the pursuit of a university degree and to leading the good life.

The extent to which universities demand a mandated common core of liberal arts subjects of their students varies from that of Ivy League school Brown University, where the only curricular requirement for graduation is that students take any 32 courses of their choice and pass at least 30 of them, to St. Johns College, with campuses in Annapolis, Maryland, and Santa Fe, New Mexico, a prestigious school with a curriculum based on the classics of Western thought, where the entire curriculum is composed of the common core with no electives. While these two schools serve as bookends in this regard, the fact is that more and more universities are turning to some sort of a

required core curriculum as a way of anchoring the university experience in a world of academe where too much choice is thought to be not merely overwhelming but not truly educational.

The Association of American Colleges and Universities (1998, 2006) has issued a *Statement on Liberal Learning*, in which this prestigious group makes a case for an education that “is one that prepares us to live responsible, productive, and creative lives in a dramatically changing world” (p. 1). The report of the AAC&U “calls for a dramatic reorganization of undergraduate education to ensure that all college aspirants receive not just access to college, but an education of lasting value.” Central to the call for reorganization of the undergraduate curriculum is an attempt on the group’s part to argue for a curriculum that coheres around general courses as opposed to a “college degree [that] more frequently certifies completion of disconnected fragments than a coherent plan for student accomplishment.”

AAC&U’s plan calls for intentionality on the part of schools, faculty, and learners, particularly producing students who are empowered, informed, and responsible. Empowerment includes the abilities to communicate effectively, to analyze and solve problems, to work with complex systems and groups, to demonstrate intellectual agility and to manage change, and to transform information into knowledge and knowledge into judgment and action. The informed individual is one who understands the human imagination and is aware of the contributions of many cultures, who has knowledge of the interrelationships within and among global and cross-cultural communities, who possesses the means of modeling the natural, social, and technical worlds, and who has a grasp of the values and histories underlying U. S. democracy. The responsible learner is a citizen who has a sense of social responsibility and ethical judgment, who possesses intellectual honesty, who feels a responsibility for society’s moral health, who participates actively as a citizen of a diverse democracy, who discerns the ethical consequences of decisions and actions, and who possesses self respect and respect for others. This is an estimable set of attributes. AAC&U is convinced that the attainment of those character qualities by individuals is more possible where liberal education forms the core of the university undergraduate experience than it is where narrow specialized training is the essence of a university education.

The question of what exactly is a liberal education in the 21<sup>st</sup> century is not one on which complete agreement can be found. However, without rushing into the matter of specific courses or readings, it is possible get at the larger more agreed-upon essence of what it means. First of all, there is the idea that a liberal education includes a process of induction to the community of great thinkers and the ideas that have shaped civilization building over the years. In the past, such ideas were drawn principally from Western civilization and included the well-known pantheon of writers and thinkers from Greece and Rome, the literature of the High Middle Ages through the Renaissance, Reformation, and Enlightenment, and the contributions of great thinkers of the 19<sup>th</sup> and 20<sup>th</sup> centuries. More recently, Eastern thought has been included, and the 19<sup>th</sup> and 20<sup>th</sup> century canon has been revised to include women, minorities, and the contributions of those previously not considered to be in the mainstream.

A second purpose is found in the attention given to contemporary cultural and social issues and their significance to an educated citizenry. This emphasis is found less in a study of separate disciplines than in the integration of thought based on insights from the humanities, particularly literature, history, and philosophy as well as the fine and performing arts, and the natural and social sciences. And as a result of the experience, students ought to grow in their sense of obligation to humanity, their public and private responsibilities as citizens in a democratic society, and in their emotional, social, and moral integrity.

The liberal arts include studies that encourage the linkages between and among separate disciplines, particularly those disciplines that focus on large questions of our humanity as opposed to those disciplines that offer skills training and expert knowledge within particular disciplines. The argument that the liberal arts should be the core of the undergraduate experience, with narrow, more specialized training reserved for graduate school, has received renewed energy of late. Such prestigious private schools as Harvard, Yale, Penn, Chicago, Princeton, and many of the high profile state research-oriented universities including the University of Michigan, the University of California, and the University of Washington have committed themselves to a serious renewal of the idea of a liberal education as the essence of an undergraduate education. The argument in each case is a familiar one: the liberal arts encourage leadership, reasoning, creativity, invention, flexibility, culture, expression, ethical judgment, and a deeper sense of connection to one's fellow human beings. Anecdotally making the case for an improved core program of liberal studies at the University of Washington, Keith Benson, a UW professor of medical history and ethics noted that when UW graduates are interviewed during the application process to the UW School of Medicine, they excel in the amount of specialized training they have but fall far short of students from other institutions when asked to speak about the ethical and social aspects of matters of life and death (Philipsen, 2000).

Making the case against technical specialization in undergraduate education, William Shafer and Amy Putnam write: "Until recently, educators were able to cope with disciplinary knowledge growth by adding technical content to the undergraduate curriculum. However curricula have now been diluted to the point that higher education is being criticized for providing inadequate technical training in major disciplines as well as inadequate general education" (2006, p. 167). They go on to argue that the answer is not to provide further specialization at the undergraduate level because to do so will only exacerbate the already widespread perception that current university graduates are not well-rounded individuals. Their answer is that the only viable solution to the problem of exponential knowledge growth within disciplines is to provide needed technical specialization at graduate or at continuing professional education levels.

Shafer and Putnam cite their own specialty, accounting, as a case in point. Prior to 1900, they note, no American university offered an accounting major. But due to "the passage of securities and income tax legislation, advancements in technology, and the increasing complexity of business and financial transactions" the accounting field became complex enough to warrant high level education and

training. Much the same thing could be said about the business major and the engineering major, and certainly majors in academic fields as well. To do justice at the undergraduate level to these highly complex fields with their subfields, to provide adequate coverage, liberal education must be displaced by vocational training. This, they are convinced is unacceptable and would serve in the long term to undermine the very purpose of a university education.

But what are we to make of a university education offered to students whose life goal is much closer to upward mobility than to the achievement of “well-roundedness”? What are we to tell students who spend four or five years in pursuit of a baccalaureate degree that the cash value of their degree is mainly good only at the “company store” where another three to five years of university will be required of them if they are to succeed? When a university education was something achieved only by a select few, most of whom did not have to worry too much about income from career, the idea of the liberally educated person was one thing, but in an age when people see university as a stepping stone to economic security it is quite another.

### **Changing Demographic Profiles**

The 19<sup>th</sup> Century profile of the American university undergraduate student was that of a 16-22 year old individual from the middle to upper classes, generally male and Caucasian. Fewer than ten percent of Americans held high school diplomas, and it was from this elite educational class that the universities drew their students. The idea of attending university in order to secure a job was certainly not pre-eminent, and in most cases students took a liberal education that exposed them to the intellectual traditions of Western civilization. Those who did use university as a stepping stone to career generally took an academic course of study as undergraduates, leaving such specializations as law, medicine, theology, etc., to graduate study.

In the period from 1945 through the 1970s, the profile changed drastically owing to such phenomena as the G.I. Bill of Rights, which made college affordable to people of modest means who had served in the armed forces and who, in an earlier generation, would not have seriously entertained the idea of participating in formal higher education, the Civil Rights movement of the 1960s that broke long-standing racial barriers, making it possible for people of color to realistically aspire to a higher education, greater means of access by larger numbers of students to grants, scholarships and loans, and the realization that a high school diploma was increasingly inadequate as career preparation as societies transformed from industrial to information bases. The bottom line of all this is that the percentage of high school graduates going on to university or to some form of post-high school education has passed the 50 percent mark. One clear effect of this is the demand on the part of students and their parents that higher education have some clear “cash value” in terms of employment opportunities. It is probably quite safe to say that today’s typical university student views his or her expenditure of time, energy, and resources more as an investment in social/economic upward mobility than anything else.



It was during this time, 1943 to be exact, that Harvard University, under the leadership of President James B. Conant, published a report titled, *General Education in a Free Society* (Dowler, 1997). The report, known popularly as the *Harvard Red Book*, famously assumed the status of a landmark document in American higher education. The report had the effect of recognizing and embracing the rapidly changing demographics of higher education, particularly the explosion of numbers of high school graduates, most of whom did not come from privileged backgrounds. As President Conant wrote, "...Our purpose is to cultivate in the largest possible number of our future citizens an appreciation of both the responsibilities and the benefits which come to them because they are Americans and are free" (Lanham, 1997, pp. 1-2). The *Red Book* signaled a new era in which colleges and universities would serve "an increasingly diverse student population, a proliferating and increasingly specialized curriculum, and the desire to teach skeptical and inquiring habits of mind and at the same time a commonly accepted body of information...." (Lanham, 1997, pp. 1-2).

### **Access to Higher Education**

One answer to the question of who may participate in American higher education is found in the fact that the country has more than 4,000 such institutions. There are more colleges and universities per capita in the United States than in any other country in the world. In fact, one problem many universities face is the competition for students, particularly high academic achievers, who often have several attractive offers from which to choose when it comes time to select a school. It is typically the case that any student with high SAT scores and an excellent high school grade point average, will not only be sought after by any number of schools, but will receive a generous portion of financial support in the form of scholarships. Other students who are actively recruited by colleges and universities include outstanding athletes and, to a lesser extent, gifted students in fields such as art, music, and theatre.

High achievers and the sons and daughters of well-to-do families need not worry whether there will be places at university for them. However, as more and more high school graduates aspire to a college education, many of them find the challenges of admission daunting and the price of tuition beyond their means. We will examine each of these issues in turn.

The National Association for College Admission Counseling (NACAC) has identified a number of issues related to access to higher education on the part of high school graduates. The news is mixed, particularly for lower income and minority students. In their most recent *State of College Admissions* (2006) executive summary report, they write:

"The path to postsecondary education continues to widen for most American students. A population wave of students has funnelled record numbers of high school graduates and students enrolled in postsecondary education. While the number of racial and ethnic minority students that successfully make the transition from high school to college

continues to slowly improve, their representation on America's four-year college campuses remains disproportionately low compared to their representation in the American population" (The Northmont Area Community Network, [www.nacnet.org](http://www.nacnet.org), p. 1).

With American college enrollment at an all time high of more than 15 million students enrolled in postsecondary education and with enrollments projected to increase through 2014 at the least, the matter of access for minority students remains problematic. White students are more likely to graduate from high school and to enroll in college than are their black and Hispanic counterparts. Currently the gap is illustrated by the fact that while black and Hispanic students represent 32 percent of the "college age" population, they account for only 18 percent of the national college population (NACAC).

Applications continue to be fueled by the population bulge, allowing highly selective colleges to become even more selective, leading in turn to greater numbers of prospective student applications to less selective institutions, with the overall acceptance rate holding at about 70 percent. The acceptance rate is somewhat confounded by the fact that about 70 percent of students file three or more applications. A gender gap does appear in the most recent admissions application data with the female to male ratio of submissions at 58 to 42 percent. Finally, no doubt reflecting advances in access to technology, online applications accounted for nearly half (49 percent) of the submissions for the 2005-06 school year.

The costs of attending university have risen exponentially in recent years. Figure 2 illustrates the rise in dollar cost amounts over the past decade. Costs of attending private and public institutions have risen in similar proportion with the ratio remaining about the same, or \$2.50 to \$1.00 private to public. Because state universities in America are supported mainly by taxation from each individual state, out-of-state students must pay a fairly sizable premium, one that approaches private school tuition in price, in order to attend them. As the costs of attending university have risen disproportionately to earnings, it is currently estimated that the average college student owes about \$20,000 in student loans by graduation. This phenomenon is an indication of the fact that students of limited means are attending university in greater numbers and no doubt increases the pressures so many of them feel to take courses that they think will prepare them to earn a substantial salary once they enter the work force.

Community colleges, which typically offer both technical/vocational training courses as well as the first two years of an academic course of study, are an alternative for students of limited means as well as for students of limited academic proficiency. Community colleges are generally far cheaper to attend and have open admissions policies, granting admission to nearly any high school graduate. In most states, the system of higher education is set up in such fashion as to allow community college students to transfer their academic credits to four-year institutions making the transition fairly easy.

Given the current trend toward a focus on research at prominent American universities, many such schools employ highly specialized research-oriented faculty members who also shoulder the responsibility of educating undergraduate students. A problematic situation that emerges from this is the difficulty that such institutions experience in attempting to keep the curriculum and courses taught to undergraduates connected by themes and broad-based in nature. Instead, when faculty members are constantly striving, and being rewarded, to fulfill their own and the institution's research needs, undergraduate students may find that they are taking courses actually geared toward ultra-specific majors (Barker, 2000). Short notes the difficulty of keeping undergraduate curricula and courses consistent with the goals of a liberal education when a drive for research is present:

“...an examination of almost any U.S. university's curricular goals or expectations and the actual courses taken by particular students demonstrates significant discontinuities between the rationale and the actuality, between the intentions of general or specialized education and the knowledge made available in the courses taken. A major reason for the existence of these discontinuities, I contend, lies with the assumption that the organization of the curriculum of higher education should be done in the same manner that the university organizes to do its research and knowledge production” (2002, p. 139).

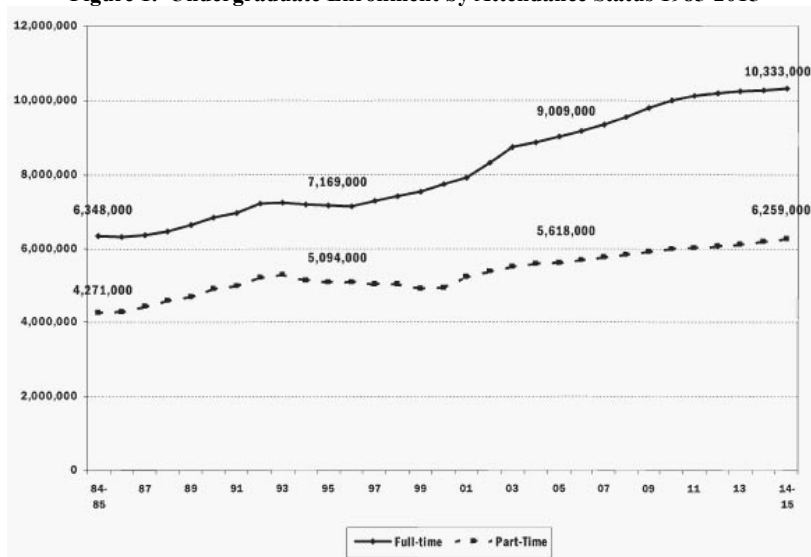
It is a great and overwhelming challenge for American universities is to attempt to achieve an appropriate balance between support for highly specialized research-oriented programs conducted by experts in narrowly defined fields, and support for undergraduate education that is integrated, deliberately not specialized, and which is broadly liberal in nature. And while the research focus of universities makes a convenient whipping boy for those who feel that undergraduate education in its traditional liberal arts form is neglected, it is well to bear in mind that the large numbers of students who come to university with a specific career focus in mind are themselves often intolerant of general education because they perceive it to be a way of sidetracking them from their real goal of career preparation.

Harvard, which heads almost every list of the world's most prestigious universities (Gilgoff, 2006; Higher Education Supplement, 2006; Institute for Higher Education, Shanghai Jiao Tong University, 2006). London Times Higher Education Supplement has taken the matter of balance quite seriously. To be sure, Harvard attracts its share of research funds from government and private sources, but its ongoing sense of obligation to liberal education comes through in one report after another. A recent paper by former Dean of the Faculty of Arts and Sciences, William Kirby, addresses the necessary task of institutions where undergraduate education exists alongside graduate and research programs to provide students with exposure to a broad spectrum of knowledge. A central purpose of the Harvard undergraduate experience, he wrote, is to give students a strong liberal foundation of knowledge for their lives and to increase their ability to work in a world where specialized fields are constantly

changing. Among the questions he posed in his report to the faculty were to consider the sense of what it might mean to be educated in the 21<sup>st</sup> century, how to define and teach the “shared elements” of an undergraduate’s education, and the problematic matter of how to teach, at home and abroad, students who will live and work in all parts of the world (2004). Among the best answers to these questions, as currently posed in attempts to rethink the undergraduate curriculum at Harvard, Penn, Yale, Columbia, Chicago, and a host of other national universities, are the creation of conditions appropriate to the development in students of their critical thinking abilities, creative problem solving techniques, process views of knowledge, and an informed ability to take in and assess information and ideas from multiple points of view.

Apart from tensions posed by the dilemma of a specialized research based focus versus a commitment to liberal education that an institution might sincerely try to resolve, the types of degrees that students seek continue to evolve. Current analyses in the first decade of the 21<sup>st</sup> century suggest that changing student demographics are contributing to changes in the kind of degrees sought after by students (see Figure 1). From 1990-2000, undergraduate programs in business led to the single largest category of baccalaureate degrees awarded in America. In fact, during this period, pre-professional and technical degrees (as opposed to liberal arts degrees) made up 60% of all granted degrees. Ironically, it was in 2000 that Neil Grabosi, Vice President and Director of the strategic planning program of the Carnegie Corporation was quoted as saying that all undergraduates in American higher education need “a sense of ethical perspective as well as an understanding of history, the economy, the world of imagination, and the esthetic experience.” When as many as three-fourths of the credits taken by an undergraduate are dedicated to discipline specific major and minor courses, this is probably impossible.

**Figure 1. Undergraduate Enrollment by Attendance Status 1985-2015**



Source: US Department of Education.

**Table 1. Number of U.S. Colleges and Universities and Degrees Awarded**

	Number <sup>1</sup>	Enrollment <sup>2</sup>
Public 4-year institutions	631	6,236,455
Public 4-year institutions	1,835	3,440,953
Public 4-year institutions	1,081	5,996,701
Public 4-year institutions	621	253,878
<b>Total</b>	<b>4,168</b>	<b>15,927,987</b>
Undergraduate		13,715,610
Graduate		1,903,730
Professional		308,647

	Number		Number
Degree awarded: <sup>3</sup>			
Associate	595,133	Doctorate	44,160
Bachelor's	1,291,900	Professional	80,698
Master's	482,118		
Enrollment highlights: <sup>2</sup>			
Women	56.3%		28.8%
Full-time	59.3%		3.5%

Source: Chronicle of Higher Education.

Notes: 1. 2000-03 figures. 2. Fall 2001 figures. 3. 2001-02 figures.

Barker (2000) notes several key factors that have contributed significantly to changes in the undergraduate curriculum. The current and future explosion of the knowledge base, to a great extent a result of academic and private research, has itself prompted questions about the quality and amount of appropriate knowledge that can be disseminated to undergraduate students via university curriculum. Advances in technology also make the case for curricular reform. It seems obvious that such advances should lead to differences in course delivery as well as content, especially given the ever-growing dependency world-wide on technology use in government, business, industry, and other career fields. A majority of today's students yearn for the credentials required to gain a good job directly out of their undergraduate program (Barker, 2000). While this appears to argue for an increasing emphasis on specialized pre-professional education at the undergraduate level, it could also provide grist for the argument that universities need to rethink their commitment to what is possible at the undergraduate level and to offer instead continuing education post graduate courses in updated technical skills and knowledge.

Certainly, technical skills are needed in abundance when it comes to the most sought after college majors in the market place. The *2005 Job Outlook Survey*, conducted by the National Association of Colleges and Employers, listed the following top ten most in-demand college majors as follows:

1. Accounting
2. Electrical Engineering

3. Mechanical Engineering
4. Business Administration/Management
5. Economics/Finance
6. Computer Science
7. Computer Engineering
8. Marketing/Marketing Management
9. Chemical Engineering
10. Information Sciences and Systems

Such a list argues for technical competence, but especially at advanced levels. For example, a four-year accounting degree, while desirable, pales in comparison in terms of salary, position, etc., to the advanced Certified Public Account degree which takes generally another three years of schooling to attain. Therefore, the issue of whether early specialization versus early liberal studies is preferable in a world of rapid change is not so easily answered.

### **Diversity and Globalization**

Numbers of sources cite a growth in the diversity of undergraduate student populations as a lever of change in curriculum. Barker (2000) describes a population of American undergraduate students diverse in the following areas: age, ethnicity, national origin, socio-economic status, cultural background, level of preparation for higher education, and motives for attending college. Each of these categories of diversity contributes to the sense of purpose people bring to undergraduate education. For instance, if greater numbers of students are motivated to obtain business degrees on the assumption that doing so will greatly improve their career possibilities, a predictable response by an institution to such a demand is to increase the number of business courses and specialized business degrees offered and to hire additional faculty if needed.

A task force at the Massachusetts Institute of Technology (MIT) was recently charged with the assignment of conducting a review of the undergraduate curriculum and making recommendations for appropriate changes. Especially noted was the diversity of the campus community as an important factor in any modifications to the current curriculum (MIT, 2004). This highlighting of diversity at the MIT campus serves as a specific example of a widespread phenomenon. It brings to light not only the increasingly diverse nature of a student body drawn from the U.S. population, but also the profound changes associated with globalization as an additional factor to consider in any view of curricular propriety in undergraduate education.

The MIT task force addressed several issues related to globalization that are currently influencing its undergraduate education program. Given the internationalization of the science and engineering fields in particular [much the same could be said about business] the task force proposed that undergraduate students need a greater understanding of different cultures and intellectual traditions. In

a global society, a broad knowledge of the values and key components of different populations and cultural and ethnic groups may be as important as technical skills to strong working relationships between and among members of professional communities around the world.

Globalization, for all its perceived negative consequences, can have positive effects and will surely continue to exert a growing effect on undergraduate education in the United States, especially in the following fields: science, technology, engineering, and mathematics (Weseman, 2006). International connections, so the argument goes, must be strengthened as a result of this globalization. A global outlook, where international knowledge development is the focus, can already be seen as a change in effect at certain universities throughout the U.S. At the University of Maryland, the East Asia Science and Technology program (EAST) threads East Asian themes throughout traditional technology, engineering, math, and science coursework. Another similar program can be seen at Worcester Polytechnic Institute in Massachusetts. Students in the Global Perspective Program at Worcester complete two months of interdisciplinary research projects for local associations in countries such as Australia, Europe, and Africa (Weseman, 2006). These two examples are fairly typical of this trend.

### **Service Learning**

It is difficult to find the university or college that has not gotten on board the service learning bandwagon. The idea is to get students out into community life in ways that bring about connections between their university studies and the “real world” of business, commerce, government, education, health care, industry, etc., Addressing service-learning in an intergenerational format, Nichols and Monard write, “The growth of intergenerational service-learning in career preparation has been demonstrated by the number of professional schools now interested in including an experiential component in their curricula” (2001, p. 38). An examination of the websites of most institutions of higher education will quickly convince the reader of the already widespread nature of this growing trend.

Service learning is distinguished from volunteerism in that it involves not only community service (as does volunteerism) but that the service performed is connected to academic learning. Cleaning up a stream filled with garbage represents a voluntary effort on the part of those who do it. Cleaning up a stream, studying the effects of certain types of waste on the ecosystem, and reporting back to community officials about the consequences is an example of service learning. Almost any academic course offered at the undergraduate level has the potential to add a service learning component to it. One way to think of service learning is considered it as a “value-added” aspect of an undergraduate course experience. It provides for the application of knowledge and skills in student learning while at the same time linking town and gown in mutually beneficial ways.

The University of California at Davis (UCD) is rather typical of institutions that emphasize the idea of giving back to the community through service learning. UCD has established a community service program called Human Corps, the purpose of which is to afford students meaningful

opportunities in community service. During the 2004-2005 academic year alone, more than 4,400 UC Davis students were involved in community service academic internships. The aim of these experiences is to instill an ongoing desire on the part of students to do future volunteer work, to see it as an opportunity and obligation deriving from an undergraduate education. At least at an anecdotal level, this appears to be working, given the reportedly high numbers of UC Davis graduates who continue volunteering in their communities after leaving university (The University of California, 2005).

Among the high profile institutions offering serious service learning opportunities to undergraduates are the University of California at Berkeley, through its Service Learning Research and Development Center; the University of Colorado's Service Learning Office; and the University of Michigan's Center for Community Service and Learning. Universities that regularly offer special courses, seminars, and programs in service learning include Stanford University, University of Pennsylvania, and Cornell University. The importance of the fact that these flagship universities offer service learning programs and opportunities imbedded in the curriculum lies in the "trickle down" phenomenon which inevitably suggests that, for better or worse, whatever these high profile institutions do, others are sure to follow.

Service learning represents an attempt to make of a college graduate something more than an individual who him/herself possesses high level work skills and a cultivated mind. It is a reminder that the citizenship goal is taken seriously by universities. University graduates are privileged members of society, people to whom much has been given, and, as the Old Testament scriptures remind us, to those to whom much has been given, much is required.

### **Distance Learning**

The rise of new technologies, particularly the world wide web, has breathed new life into an old idea, that of distance learning in the pursuit of a university education. The older types of distance learning, correspondence courses and courses taken over radio or television, have been largely displaced in the past ten years by internet learning. The invention of moveable type more than five centuries ago made possible the text and the textbook, forms of distance learning that continue apace to this day. Distance learning can be described as any learning that does not occur in classroom-style face-to-face teaching and learning with students and teacher. It takes multiple forms, including the following: internet, interactive TV, video streaming, audio/videocassettes and CDs, and virtual laboratories, to name a few. The concept of distance learning has gained popularity in recent years, and most American universities, including the more prestigious and their less prestigious counterparts offer it to their students.

For profit institutions, not-for-profit institutions, and even traditional universities, have embraced distance learning in greater and lesser degrees. At one end of the spectrum is the claim that the virtual campus is the campus of the future, and at the other is the acknowledgement that technological change



has challenged the traditional idea that worthwhile university teaching and learning must perforce be done in face-to-face classroom environments. While there is some truth to all of this, it is also the case that distance learning through the internet diminishes a school's need for buildings, library collections, land, etc., so the cost saving factor is certainly one to be reckoned with.

In 1992, the U.S. Congress passed legislation known as "the 50 percent rule," a regulation that prevents any college that enrolls more than 50 percent of its students in distance learning from participating in federal student-aid programs. However, the Congress will quite likely rescind this legislation, opening a floodgate that is sure to effect both traditional and nontraditional institutions of higher learning (2006).

Howell, Williams, and Lindsay (2006) have identified a number of trends affecting distance education, perhaps the most significant of which, one of sheer population growth, is the prediction by the National Center for Educational Statistics prediction that college enrollment will have grown 16% in the decade between 2000 and 2010. This means that, given present infrastructure, there will be more students than the facilities at traditional colleges and universities can accommodate. Distance learning seems destined to play a role in ameliorating this problem. As university organizational structures decentralize, access to information through the internet expands, non traditional students seek coursework in higher education, and the number of for-profit degree-granting institutions grows, distance learning will continue to change the shape of university life.

### **High Profile University Models**

Any examination of trends in the curriculum of undergraduate education warrants a look at current models of study in place in leading institutions across the country. Yale University's philosophy of undergraduate education is that students should be required to fulfill certain broadly conceived distributional requirements in order to gain experience with a variety of disciplines and methods of learning. Though the school does not consider these requirements a complete education, Yale officials make it clear that certain distributional requirements are the foundation on which a genuine higher education rests. Distributional requirements at Yale are in fact quite minimal and are broken down into two categories: discipline requirements and skill requirements. Discipline requirements include credits in humanities and arts, social science, and natural science. Under the skill requirement, students are expected to complete course work in writing, quantitative reasoning, and foreign language, depending on the student's level of proficiency upon entrance to Yale. The reader will note that it would be next to impossible to attend a university for four years and not complete course work in these areas.

The University of Pennsylvania's curriculum model for its undergraduate students is similar. However, the requirements are organized into foundation approaches and sector requirements. To fulfill the foundational approaches segment, students must take a writing course, enough credits in a foreign language to gain competency, and one quantitative data analysis course. In addition, students

are expected to have taken an advanced placement calculus course pre-college, or satisfy the formal reasoning and analysis requirement by enrolling in a course where calculus is a pre-requisite. A cross-cultural analysis requirement completes the components deemed necessary for a strong educational foundation at the University of Pennsylvania, but this requirement can also be satisfied by what the university calls sector requirement courses (The University of Pennsylvania, College of Arts and Science, 2006).

Undergraduate students must complete one course in each of seven categories at Penn to fulfill the Sector Requirements. The sectors are as follows: (I) society, (II) history and tradition, (III) arts and letters, (IV) humanities and social sciences, (V) living world, (VI) physical world, and (VII) science studies, and additionally, a quantitative skills requirement consisting of one designated course. All courses in these sectors are technically considered electives and do not necessarily count towards a student's major. Finally, Penn undergraduates are expected to declare a major course of study prior to the summer before their junior year.

At the University of California, Berkeley, requirements for a bachelor's degree must be satisfied via four sources: the University, the Berkeley campus, the student's college or school, and the student's department. The University requires an entry-level writing course or demonstration of proficiency in English along with the ability to effectively express intelligent thoughts in writing. A second University requirement is that of an American history and institutions course leading to a clear understanding of the history and governmental system of the U.S. The Berkeley Campus American Cultures Breadth Requirement is the second of the four undergraduate requirement domains. To satisfy it, students must take a course in American cultures. As far as the college or school requirements go, there are differing expectations for degrees in different colleges and schools within the institution. Most require two semesters of lower division work in composition to fulfill a reading and composition requirement. Every undergraduate at UC Berkeley is required to select and pursue a curriculum major to fulfill departmental requirements (The University of California at Berkeley, n. d.).

The three educational institutions discussed thus far demonstrate specificity with respect to certain courses that every undergraduate must complete. In contrast, Duke University's liberal arts curriculum is considerably less restrictive than most other undergraduate programs across the U.S. At Duke, undergraduates are given the opportunity to plan their own course of study and choose courses they deem appropriate, with the help of an advisor. Students are given guidelines to follow and are asked to select courses from five so-called "Areas of Knowledge" the school recommends they experience: arts, literature, and performance; civilization; social sciences; natural sciences; and quantitative studies. The only truly required course for undergraduates is a one semester course in academic writing. Thus Duke University and Brown University, each of which pursues a student-interest *laissez faire* policy and St. Johns College and Thomas Aquinas College, with their non-elective all-required approaches, could be considered bookends of the undergraduate liberal studies curriculum.

## Career Considerations

Nearly two dozen schools nationwide are among the growing number to offer students cooperative work positions as an integral component of the undergraduate experience. An article in the *U.S. News & World Report 2006 College Edition* focused on one such institution, Northeastern University in Boston, Massachusetts (Gilgoff, 2006). Northeastern gives undergraduate students the opportunity to be placed in paid, six-month-long jobs related to their intended major field of study and career. During a cooperative work stint, a student's tuition is waived, and class attendance is not required. Early on students learn whether or not they wish to pursue a given field of study. Also, students gain practical field experience at their work sites which can lead to job placement resulting from connections made. An obvious drawback, in contrast to the benefits already noted, is that students must assume a "career" focus early on, at the very time when liberal education advocates say they should be concentrating on the great ideas of literature, history, the arts, sciences, and other less "practical" studies.

Traditionally, a core curriculum of some kind has been a requirement for undergraduate students at nearly all four-year colleges and universities. Typically, required courses have included the following areas: literature, mathematics, sciences, arts, and humanities. A novel trend in the undergraduate curriculum, even at those institutions where the liberal arts tradition is firmly ensconced, has been to modify course requirements based on student interest. Ditmore writes, "Because students have demanded customer service from these institutions, such that primarily career-based courses are required for graduation, many Liberal Arts colleges and universities have shifted their focus from broad based course requirements to limited course requirements in specified subject areas" (2001). It should be noted that the student interest argument is an old one, at least as old as Plato, who wrote in the 4<sup>th</sup> Century B.C. that you cannot force the mind in the same way you can force the body through exercise, and Quintilian, who wrote in the 1<sup>st</sup> Century A.D. that it is of little value to require students to study things that do not interest them.

Student interest in collegiate studies that have cash value, that is, in courses and related experiences that are designed to pave the way for a productive career, has for at least the past half century been quite clearly a driving force, a reason for attending school. As increasing numbers of college students seek career-based college experiences intended to give them a head start in obtaining a job following graduation, there is at least some irony in a situation in which recently surveyed business executives expressed the opinion that a good employee, one showing initiative, creativity, and insight, more likely would be the product of a traditional liberal arts curriculum, where he or she might gain a reflective, broad-based education, as opposed to one afforded by discipline-specific knowledge aimed at a career path (Ditmore, 2001).

The curriculum at Reed College in Portland, Oregon, a small prestigious private liberal arts institution known among other things for its successes in producing Rhodes scholars, definitely departs from the trend toward increased discipline-specific specialization. Reed's required reading list

has a classical focus, and its classes, invariably small, are geared more toward discussion and an exchange of ideas rather than lectures. Grades are assigned, but students do not see them unless they specifically request them. The idea of this approach is to encourage students to be more interested in the processes of learning and growth in their undergraduate experience than in what they might absorb through lectures and didactic teaching (Hallett, 2006).

Reed College's educational curriculum represents an attempt on the part of the institution to create a balance between broadly-based liberal studies and close, in-depth study in an *academic* discipline. Reed offers no professional majors. All students enroll in a year-long course in the humanities. In addition, liberal studies in the arts, sciences, mathematics, and foreign languages engage students in different forms of intellectual inquiry. Students begin the process of selecting a concentration toward the close of their sophomore year. This leads to a major, which is either a single academic discipline or an interdisciplinary major, for example, American Studies, Literature-Theatre, Mathematics-Physics, etc. All students must take a qualifying examination in their major field at the close of their junior year. Seniors engage in a one-year research project in their major field of study and are required to defend a thesis based on their research (Hallett, 2006).

The University of Chicago has a long standing liberal arts approach to the undergraduate curriculum. In fact, many of its basic core foundational approaches to the curriculum have remained stable since the 1930's when the university instituted its Great Books of the Western World curriculum under the leadership of Robert Maynard Hutchins and Mortimer Adler. Today's undergraduates, in Chicago's liberal studies tradition, are commonly expected to spend their first two years in general education courses. Hutchins and Adler were convinced that to prepare citizens for life in a democratic society it is necessary for them to spend a significant period of time devoted to the serious study of great ideas and great writing in order to appreciate the intellectual forces that have shaped Western civilization. The curriculum they instituted in the 1930s is not exactly the one required today, but the premise is the same: that a central purpose of higher education is to prepare people for citizenship, leadership, and the good life. Only after a foundation of liberal studies is in place, the argument goes, are students ready to take on more discipline-specific subjects (The University of Chicago, n. d.).

After the first two years of liberal education, University of Chicago undergraduate students pursue their studies in more narrowly defined fields, or major courses of study. In addition to the general education courses and courses specific to a student's major, about one-third of the undergraduate curriculum is composed of elective courses, invoking the doctrine of student interest.

The University of Chicago undergraduate curriculum offers a study in contrast to curricula at the majority of universities in the U.S. However, given the trend toward some form of restoration of the liberal arts component in undergraduate education, it is useful to take a closer look at the Chicago requirements for a bachelor's degree. The following distribution is required of all students:

General Education Coursework (to be completed in the first two years);

Humanities and Civilization (6 courses);  
 Natural and Mathematical Sciences (6 courses);  
 Social Sciences (3 courses); and  
 Foreign Language (options: competency exam, AP, study abroad).

Undergraduates must choose a major course of study by spring quarter of their third year. Majors range in course requirements from nine to nineteen courses. Combined, courses in the student's major and elective courses must total 27. With reference to courses, it should be noted that U. of Chicago is on the quarter system rather than the more common semester system.

A number of other prestigious institutions around the country have similar liberal studies requirements, in some cases even more stringent than those of the University of Chicago. Among them are St. Johns College, with campuses in Maryland and New Mexico, Thomas Aquinas College in California, and Thomas Moore College in Vermont. In each case, the required course of liberal studies is for the entire four years of the undergraduate curriculum. Unlike the University of Chicago, which is a private, secular school, these colleges are Roman Catholic and subscribe to a perennialist view of learning, based mainly in the Scholastic tradition of higher education.

Harvard's approach to the core curriculum is "both a requirement and a philosophy" (Kirby, 2006, p. 7). The philosophy of the core is that every Harvard graduate should be broadly educated in addition to the training he or she receives in an academic specialty. Undergraduate students are required to devote a quarter of their studies to the following areas: foreign cultures, historical studies, literature and the arts, moral reasoning, quantitative reasoning, science, and social analysis. As the descriptive literature points out, the Harvard Core is not a study of the Great Books, nor is it based on a certain amount of information gleaned from liberal studies. Neither is it a survey of current knowledge. Following is the set of assumptions on which the Harvard Core rests (2005, p. 1):

1. Students should acquire some understanding of the ways in which they can gain and apply knowledge of the natural world, of society, and of themselves.
2. Students should be exposed to other cultures and other periods so that they can better define and comprehend their own experiences in the modern world.
3. The curriculum should give students some practice in thinking critically about moral and ethical problems, examining their own moral assumptions, and judging with some objectivity the assumptions of various alternative traditions of ethical thought and practice.
4. The critical discernment necessary to understand and assess the route to knowledge within any area may be developed through the study of any one of a number of its topics. Experience suggests that students best absorb the necessary tools in courses that introduce them to a manageable quantity of knowledge. Their curiosity is most

likely to be stimulated by solving some interesting problems in a particular field, using the tools that experts use, and doing so under expert guidance.

5. The analytic talents that one develops by solving problems in different fields will have a lasting value in equipping students to pursue additional knowledge in those fields which they may need or wish to acquire in later life.

These statements make it clear that attempts to maintain and reinvigorate general education are alive and well at Harvard. The Core is “simply, an attempt to say what it means to broadly educated today, and to translate that appraisal into courses that will capture the interest of students and faculty alike” (2005, p. 2). Given Harvard’s nearly unanimous ranking at the top of any list of universities in the country and the world, this approach to the undergraduate curriculum is certain to be influential beyond the institution itself. As Harvard goes, so go others.

Harvard’s focus on both international studies and sciences in the general education requirements represent an acknowledgement of the major shifts taking place in the world economy. Globalization and the emergence of a world business market contribute to this greater emphasis on international studies since the world is more readily navigated with learned communication skills in foreign language and culture. The push to include more science in the general education requirements appears to be driven by fast-moving technological advances and the ever increasing competition among nations for market share.

Another significant curriculum change at Harvard is represented by a diminishment in the number of courses required to complete a major. The thinking behind this alteration comports with the importance of keeping specialized course knowledge to a minimum, the corollary of which is to expand the number of liberal studies offerings. Under this change, half or less of an undergraduate student’s education consists of specialized courses in the student’s major or specialized field of study. Finally, there appears to be an expansion of choice at Harvard with respect to what courses students may select from to complete their general education requirement. The term “interest” is invoked repeatedly in the Core program literature. Giving students such interest-based choice could well lead to a broader exposure to liberal studies or to a narrower focus more closely related to their major courses of study, or so it seems. At any rate, the trend toward increasing the amount of undergraduate time spent in liberal studies at this most influential of schools is clear, as is the idea of delaying the major until a sufficient amount of time has been given to the laying of a foundation of liberal studies. And given Harvard’s influence, the trend will in all likelihood spread to other schools as well, although the question of how much student choice ought to be allowed within liberal studies differs greatly from institution to institution.

### **Institutional Rankings**

How are colleges and universities ranked in the United States? How valid are the rankings? Can a student be assured of getting a “richer” undergraduate experience at a school with a high ranking than

he or she might at a school whose profile is less visible? Following is an explanation of one such system of ranking schools, published annually by the magazine, *U.S. News & World Report*. It is important to note that any system of ranking schools of higher education is rendered problematic by the fact that there are more than 4,000 colleges and universities in the United States, including national universities, regional universities, private and public universities, two- and four-year schools, schools offering degrees from baccalaureate through doctorate, religious and secular universities, for profit, non profit, and not for profit universities, etc.

Which schools are considered to be the best national universities in America? “National university” is an informal designation (except for the Army, Navy, Air Force, and Coast Guard military academies, there are no nationally funded and/or operated universities in the United States) used to identify those institutions, private and public, whose reputations are national or even worldwide, that are able to be highly selective when it comes to admissions, and that regularly draw students from around the country and the world. According to *U.S. News*, 86 private and 162 public institutions are included in the category of National Universities. All of these schools are comprehensive, offering students a broad range of undergraduate majors. Most, but not all are research-centered, and offer an extensive variety of programs for students pursuing graduate degrees (Morse & Flanigan, 2006).

In contrast to National Universities, Teaching Universities (or Colleges) are those schools, smaller and often private, where graduate education is either nonexistent or not particularly emphasized, where teaching and advising is the primary job description of the professorial role, and where classes are purposely small and typically seminar- or discussion-based. The argument can and often has been made that for an undergraduate student, particularly an undergraduate student whose primary concern is not career preparation, Teaching Universities offer the best collegiate experience. At Teaching Universities, students are expected to be actively involved in the intellectual life of the institution and to work closely with one or more of their professors. Students at such institutions have an academic advisor who offers guidance and counseling. Professors are expected to keep regular office hours and to take seriously the out-of-class aspects of student growth and development. Because Teaching Universities are typically small schools, they are able to make a serious commitment to curriculum and program integration and articulation. Because the commitment to individual students is crucial, one finds project, thesis, and student-research assignments in abundance, basically taken for granted by students and professors alike.

Seven key criteria are used by *U.S. News* to rank the national universities. The first of these is peer assessment. Peer assessment surveys are given to leading academics including presidents, provosts, and deans who are then asked to rate the academic programs of neighboring or peer schools. While these ratings have a subjective quality, such measures as publications, research grants received, patents granted, and endowments held, among other factors, are certainly taken into account. The reader will note that these measures do not necessarily address the needs of undergraduate students.

Student retention rates are a second criterion. It is one thing for a school to be highly selective

when it comes to choosing who indeed may enroll. It is yet another thing for such schools to retain their students in notable proportion. High retention rates are considered an indicator of the effectiveness of academic programs and services. Typically, an institution's six-year graduation rate and its freshman retention rate are combined to figure a school's retention score (Morse & Flanigan, 2006).

A third criterion of excellence is one called faculty resources. Faculty salaries, percentages of professors with the highest degree in their field, student-faculty ratios, the percentage of full-time faculty, and class sizes (including the percentage of courses with fewer than 20 students and percentage of courses with 50 or more students) are all combined under this umbrella term.

Student selectivity is the fourth ranking criteria. This includes the SAT or ACT test scores of enrolled students, the number of freshmen who graduated in the top 10% of their high school class, and the school's acceptance rate, that is, the number of students actually admitted versus the number of students who apply for acceptance, although this figure is not easily derived since highly qualified students often submit applications to a number of schools. Harvard, certainly at or near the top of any ranking, typically accepts about one in ten applicants, which is daunting to say the least when one considers that with a few exceptions only highly qualified students apply to Harvard in the first place.

Financial resources, or the average amount a university spends per student on instruction, student services, equipment, and facilities make up the fifth criterion. While money spent in such pursuits does not alone equal quality, students and their parents do reasonably deserve some assurance that an institution places a premium on its students' welfare. Certainly, the value-added effect of an institution's endowment is a significant issue. Private schools that are primarily tuition driven and state schools where budgets are tight are less in a position to built new facilities, hire addition faculty, provide quality services, etc., than are their wealthier counterparts where benefactors supply funds above and beyond tuition revenue.

A criterion called graduation rate performance is a sixth measure of quality. This is explained as the measured difference between the actual six-year graduation rate for a class and the graduation rate that was predicted for the same class when they were enrolled as freshmen. This is to be sure a retention measure, but it is also a measure of perceptions of long-term support and interest on the part of a university to its students. This has been a particularly controversial issue regarding student athletes, many of whom attend university during their four years of athletic eligibility but who in many cases do not come close to meeting the requirements for graduation.

Finally, alumni giving rate is factored into a school's ranking. This is calculated as the percentage of former students who have donated funds to their school versus those who did not donate, taken over a period of several years (Morse & Flanigan, 2006). Alumni giving is considered an essential revenue stream for the most prestigious of universities, and it can certainly be considered as a measure of satisfaction and good will toward their school felt by former students. The number of buildings named in honor of alumni on certain campuses is often an indicator of just how significant this source of



support can be. The size of an institution's endowment, mentioned earlier as an aspect of a school's financial resources, and alumni giving rate is a contributing factor along with other gifts and grants received.

The following list includes a number of the institutions mentioned in this chapter and where they are currently ranked by U.S. News & World Report (2006) based on the above criteria:

#### **Ranking of National Universities**

1. Harvard University (Pr)
2. Princeton University (Pr)
3. Yale University (Pr)
4. University of Pennsylvania (Pr)
5. Duke University (Pr)
6. Stanford University (Pr)
7. California Institute of Technology
7. Massachusetts of Technology (Pr)
9. Columbia University (Pr)
10. Dartmouth College (Pr)
11. Washington University of St. Louis (Pr)
12. Northwestern University (Pr)
13. Cornell University (Pr)
14. Johns Hopkins University (Pr)
15. Brown University (Pr)
16. University of Chicago (Pr)
17. Rice University (Pr)
18. University of Notre Dame (Pr)
19. Vanderbilt University (Pr)
20. Emory University (Pr)

\*Pr = Private    Pu = Public

#### **Ranking of Teaching Universities**

1. Williams College (Pr)
2. Amherst College (Pr)
3. Swarthmore College (Pr)
4. Wellesley College (Pr)
5. Carleton College (Pr)
6. Pomona College (Pr)
7. Haverford College (Pr)
8. Middlebury College (Pr)
9. Claremont Mudd College (Pr)

High profile universities often achieve their reputation more from research and development and an emphasis on graduate programs than on the attention they pay to the undergraduate curriculum. This is not to say that students perforce receive a poor education at such institutions, but when the attention is focused elsewhere, there is reason to think that students may not be receiving the attention they need in their formative undergraduate years. Without question, it can be said that there is less undergraduate student nurturing and guidance at research-oriented universities than one would find at teaching universities. The question whether an institution can be both a research university and a teaching university is not easily answered. The self-directed, career-oriented undergraduate student may even find the more anonymous atmosphere of a large, research institution to his or her liking. But those who seek academic intimacy and a sustained emphasis on liberal studies will no doubt feel more comfortable at a teaching college or university.

What happens when research overshadows teaching, when publications are considered more important than advising and office hours? To what extent can any institution achieve excellence in collegiate instruction and advanced research? The obvious emphasis on discipline-specific graduate study and advanced research at one such institution, the University of Texas at Austin, has caused led some observers there to conclude that undergraduate education has suffered at a time when the research function has thrived. (The University of Texas at Austin, 2005) In 2004, a UT commission

completed a two year analysis of the university's undergraduate curriculum, finding it wanting. A follow up Task Force on Curricular Reform affirmed that finding in 2005 (The University of Texas at Austin, Office of Public Affairs, 2005). Essentially, the Task Force concluded that the university has failed to provide undergraduate students with the opportunity to acquire core knowledge of the liberal arts, that is, a broad-based education, to balance out their otherwise discipline-specific coursework. This conclusion was reached in spite of the fact that the university offers a wide range of undergraduate level courses. The question of why students do not sample widely from the liberal studies courses available in order to broaden their own knowledge base remains. So does the matter of a truly articulated, connected core of liberal studies. While this could in part be a matter of advising, it is also true that current discipline-specific and/or major requirements are far too specialized to allow students to take many classes outside the range of their major.

An apparent difficulty in promoting a substantial change in the undergraduate curriculum, one that would ensure greater emphasis on connected, liberal studies is that the university actively works to provide more courses taught by full-time resident research/graduate faculty in order to expose undergraduates to important research being conducted at the institution. The following five recommendations for improving undergraduate education are outlined in the Report of the Task Force:

1. Undergraduates should take a "Signature Course" in each of their first two years. These courses cover broad intellectual topics in which students meet top faculty and learn of resources at the University of Texas.
2. Coursework should be organized into clusters to ensure undergraduate exposure to a greater variety of courses that contain obvious and significant connections with one another.
3. Students should be encouraged to explore a broader range of courses before they declare a major. This may actually be a more effective way for students to figure out their true calling in terms of a specific academic or professional discipline.
4. A new undergraduate "University College" should be established within the larger structure of the University. Such a college should prove user friendly and supportive for entering freshmen; however, such a move would require a significant change in the existing administrative structure.
5. Additional funding should be sought out in order to make the preceding recommendations possible (The University of Texas at Austin, 2005).

The University of Texas situation, perhaps dilemma being perhaps too strong a word, is quite typical of large prestigious state universities in particular. The changes described above would demand basic restructuring of mission. Given the demand for resources, the question of priorities may well argue against it. An answer that has been around for years is that large research-oriented

institutions should become graduate schools with clear research missions and agendas, leaving undergraduate teaching and learning to smaller state and private institutions where teaching and advising are major faculty responsibilities. While this answer contains much merit, it would also provoke much controversy, and it is very unlikely that it will happen, if for no other reason than that big time collegiate athletics are firmly entrenched as part and parcel of American undergraduate education. Another possible solution is for research-oriented universities to offer undergraduate instruction only at the junior and senior levels, leaving the first two years of university to community colleges and other smaller institutions. Neither of these recommendations seems to be receiving a great deal of serious consideration for the time being.

As American higher education enters its fifth century, it can be viewed as one of the nation's crowning achievements. Nowhere else in the world is there such a large collection of high quality institutions devoted to higher learning. With more than 4,000 colleges and universities, the United States has come closer than any other society to the dream of making higher education possible for all its citizens. Problems of curricular propriety, affordability, and access remain to be solved, but the climate of reform that exists in schools from the most prestigious to the most obscure leaves much room for optimism. The firmly established goal structure of academic excellence, citizenship, self-realization, and career opportunity continues to present an ongoing challenge for universities and colleges.

Does it matter where a student goes to college or university? Certainly, some American universities have far more prestige than others. In that sense, it may indeed matter, especially when it comes to initial job placement. But the 4,000 odd colleges and universities in the United States all have something to offer any serious student, and some lesser known institutions of good quality are far more accessible and affordable than their more high profile counterparts. In a provocative article titled, "What Does College Teach?" Richard Hersh (2005) wrote:

"In *How College Affects Students*, ...Ernest Pascarella and Patrick Terenzini found that simply going to college, any college, makes a major difference in a young person's psychological development: students come away with improved cognitive skills, greater verbal and quantitative competence, and different political, social, and religious attitudes and values. But although the researchers found wide variations in learning within each college or university, they were unable to uncover significant differences between colleges once the quality of entering students was taken into account" (pp. 140-143).

The American system of higher education is remarkably open. Not everyone who dreams of it can get into Harvard, Princeton, or Yale. But even the struggling high school graduate with marginal test scores and grade point average can find a school that will give him or her a chance to succeed. Community colleges have for the most part open admissions policies and reasonable tuition rates. The

student who proves himself in the two years of community college can invariably then move on to a four-year school there to pursue the baccalaureate degree. The system is open in yet another way, and that is to the forty-year old who never participated in higher education, having nothing more than a high school diploma, but who decides to come to school. In many, if not most, societies this would be considered an impossibility, but in the United States, such an individual making such a choice is not even considered to be particularly unusual. It is certainly true that people of means have more possibilities, but the system has been and will remain an open one.

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