CURRICULUM DEVELOPMENT IN EDUCATION

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in Education

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Contents

Preface

Curriculum development in education is a multifaceted process that involves careful planning, implementation, and evaluation to ensure effective learning outcomes. At its core, curriculum development aims to design comprehensive frameworks that guide teaching and learning activities in educational settings. This process begins with an assessment of the educational needs and goals, where educators identify the knowledge, skills, and competencies that students should acquire. Based on these assessments, curriculum developers design curriculum frameworks that outline the scope and sequence of learning objectives, content, and instructional strategies.

Once the curriculum framework is established, the implementation phase involves translating the curriculum into classroom practice. Educators select appropriate teaching methods, resources, and learning activities to engage students and facilitate their learning. This phase also involves collaboration among teachers, administrators, and stakeholders to ensure alignment with educational goals and standards.

Assessment and evaluation play a crucial role in curriculum development, allowing educators to measure learning outcomes and assess the effectiveness of the curriculum. Through various assessment methods, such as tests, quizzes, projects, and performance tasks, educators can gauge students' understanding and mastery of the curriculum content. Evaluation provides valuable feedback that informs curriculum revisions and improvements, ensuring that the curriculum remains relevant and effective.

Furthermore, curriculum development in education requires ongoing reflection and adaptation to meet the evolving needs of students and society. Educators

must stay abreast of current research, best practices, and educational trends to inform curriculum decisions and innovations. Collaboration with colleagues, professional development opportunities, and engagement with stakeholders contribute to continuous improvement in curriculum development processes.

Ultimately, curriculum development in education aims to promote student learning and achievement by providing meaningful and relevant learning experiences. By incorporating diverse perspectives, engaging instructional strategies, and fostering critical thinking skills, curriculum developers strive to empower students to succeed academically and thrive in an ever-changing world.

Exploring the intricacies of curriculum development in education, this book offers insights into designing effective learning frameworks tailored to meet diverse educational needs.

–Author

1

Models and Technological Resources for Curriculum Development

Kennedy states that, "…curriculum developers must reflect on actual practice to understand (appropriate) curriculum development practice". There is a debate about the cost/value relationship of technology implementation in secondary education. While much technology may provide long-term advantages in educational budgeting, provided resources are allocated towards efficient collaboration, this is, however, dependent on a curriculum focus which identifies the need for collaboration and supports its' implementation.

A cost factor is obsolescence which is an important consideration in technologically related curriculum especially, due both to the cost factor of hardware, software and support. The power of change that technology supports means that the contexts applied to developing technological (and 'information') literacy become ever more important. Whatever choices are made, it is important to give serious consideration to the factor of rapid obsolescence, and design learning units that interpret curricula appropriately and are sensitive to the constantly changing nature of technology and consequent literacy demands. In response to this, educators can and should build courses that interpret curricula using tools and modalities that are as far as possible 'future proof', while still having sensitivity to current social context.

If this shift in curriculum focus is achieved, then technology can become a 'virtual' benefactor, providing the means to access greater resources than could otherwise be afforded, by virtue of the fact that resources so obtained can be broadly shared. A wide-band networked infrastructure with access to appropriate

software tools allows students, classes, and teachers to access and produce online materials, do extensive collaborative work, and share instructional resources. The Internet, for example, provides online information and is a medium by which students and schools can communicate and collaborate, opening opportunities for broad consultation. In this way, Information Technology infrastructures can impact on conventional instruction processes by expanding learning resources beyond individual teacher and school materials, providing lower cost sourcing of information and expertise, and providing communication links for isolated students.

- These advantages are only accessible however, if curriculum models facilitate their implementation, if the funding levels match the rhetoric, and if expenditure decisions are appropriate. Decisions which are not collaborative risk degeneration of the process of effective implementation of technological facilities and can cause overall degeneration in educational resources. Very few areas are more expensive than technological infrastructure. Education Queensland's' collaboration with educators, in providing funding assistance develop appropriate electronic resources, illustrated in the Education Queensland Curriculum Resource Exchange is laudable, and demonstrates in its details the power and strength of collaborative and supported electronic information development processes. However assessment of current efforts in regards to collaborative decision making show mixed results.

- This is important consideration, as the cost of technology is frequently raised by advocates of barriers to incorporating technology into the educational environment. Blocks to the implementation of a strong technological infrastructure, associated with an appropriate curriculum, are largely psychosocial rather technical or directly economic. It is about what we choose to spend money on. The issue reflects the complications inherent in the social construction of curriculum, to which solutions can only be found through effective collaboration between community, educators and administrators.

MODEL OF CURRICULUM DEVELOPMENT

Ralph is a General Partner of Battelle Ventures L.P. and Innovation Valley Partners L.P. and he manages the Washington DC regional office located at Battelle's Crystal City site. He covers all aspects of the venture business, including deal sourcing, due-diligence, deal negotiation and transaction closing, Board of Director duties, and start-up company development.

Ralph has led or co-led various venture investments for the firm including BioVigilant, Hi-G-Tek, Nistica, Rajant, RemoteReality, Sypherlink, and he serves on the Board of Directors for each of these Companies. Prior to entering the venture capital industry, Ralph gained significant experience in technology R&D, business development and investment banking. He worked previously as a Senior Research Scientist at Bell Labs, in Business Development at Lucent

Technologies, and as an Investment Banker on Wall Street at Goldman Sachs and JPMorgan. At Bell Labs (originally the R&D unit of AT&T Corporation and Lucent), Ralph worked almost ten years as a Research Scientist, Engineer and Technology Manager, focused on semiconductor microelectronics processing, photonics components and fiber-optics devices, advanced materials and nanotechnology.

He authored over 40 scientific publications and technical conference presentations, had his research work featured in *BusinessWeek* and *Fortune Magazine* and was cited by *MIT Technology Review Magazine* as one of the top 100 technology innovators in the USA for 1999-2000. In addition to R&D, Ralph worked on business development/strategy teams supporting Lucent Microelectronics (which became corporate spinout named Agere Systems Inc. subsequently merged into LSI Corporation), the Lucent Optical Network Communications group (now merged into Alcatel) and the Lucent Corporate Ventures group. After Lucent, Ralph made a transition to Wall Street investment banking, working at Goldman Sachs and then at JPMorgan, on mergers/acquisitions, equity offerings and convertible-debt transactions. At Goldman Sachs, Ralph covered the Technology Media & Telecommunications (TMT) industry sector, focusing on semiconductor microelectronics, photonics, communications infrastructure hardware and software. At JPMorgan, Ralph covered the Chemical Technologies industry sector, focusing on Specialty Chemicals, BioPharmaceuticals, Oil & Gas, and Energy/Power. He then joined the investment team at Battelle Ventures.

Ralph gained his academic training from Princeton University and the Massachusetts Institute of Technology (MIT), receiving a PhD in Engineering (Chemical & Biomolecular Engineering focus) and an MBA in Finance (Corporate Finance & Strategic Planning focus). He holds twelve patents issued to Bell Labs, OFS Optics and Agere Systems for innovations in semiconductor microelectronic devices, optical-fiber & photonics, fuel cells, flat panel displays, and nanotechnology systems. Ralph was selected as a Kauffman Fellow by the Centre for Venture Capital Education & Entrepreneurial Leadership, affiliated with the Ewing Marion Kauffman Foundation. He was also appointed a Robert Toigo Foundation Fellow in Finance & Technology Entrepreneurship at MIT Sloan School of Business Management and appointed a Price-Babson SEE Fellow in Entrepreneurship Education & University Curriculum Development at Babson College Centre for Entrepreneurship. Ralph remains active in higher education as a University adjunct professor and senior lecturer in Engineering Innovation Management, Entrepreneurship and Science/Technology Commercialization. In addition to his several for-profit Corporate Board Directorships, Ralph serves various non-profit educational organizations, academic colleges and universities as Advisory Board Member or Board of Trustees Member; he also works regularly with the National Science Foundation (NSF) on SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) programmes.

D.K. Wheeler

A perceived nexus between research and teaching outcomes supports the sponsorship of research by universities and the designation of research as part of academic job descriptions. In fact, this belief has consequences that pervade academic life. It is strange, therefore, that an academic community that is trained to question and challenge ingrained beliefs in other communities has not analysed a philosophy that has significantly impacted their own way of life.

Is the research-teaching relationship a myth? If it is not a myth, what specific link is there between research and teaching? Further, for which research, and which aspect of teaching (for example content, strategy or method), can linkage statements be made? Indeed, the stereotypical academic is an absent-minded, research-focussed professor to whom no sane, worldly person can relate.

An attempt to more specifically explain an expectation that research activity produces higher teaching quality is faced with many problems. For example, general statements that make claims about the beneficial impact of research on teaching do not normally clarify:

- What aspect of teaching they refer to (for example, what is taught, how it is taught or the tools and materials used in teaching);
- Whether the statement relates to teaching in general or the teaching of that specific researcher;
- Which research can have this beneficial impact on teaching; and
- How research can improve teaching.

This chapter focuses on the use of research in improving academic teaching outcomes. The range of meanings commonly adopted for 'teaching' in this context resembles a formal definition of curriculum. Consequently, to examine the way that research can influence university teaching and learning in their broadest sense, this chapter considers the differing nature of 'curriculum' and the differing nature of 'research' since, in this context, both of these terms can have different meanings to the user. In fact, it appears to the writer that the discussants in many conversations about using research in curriculum development experience a totally different understanding of their discussion.

The objective of this chapter is to clarify which research can inform curricula at different levels. An outcome of this analysis is the ability of academics, both as researchers and as teachers, to identify the use of research in curricula and its development. Conversely, the findings may be used as a guide to select research projects.

The initial analysis in this chapter is of curricula and their development. The analysis is then extended specifically to discuss accounting curricula development. First the chapter identifies different levels of curricula and then highlights key influences on curricula requirements before explaining curriculum development through its four categories of nondiscrete decisions and their evaluation. Next, the chapter specifies four ways in which research can have an impact on curricula development. Finally, the chapter discusses specific research topics that have impacted, or can impact upon curriculum development in accounting courses. These research topics are categorised in the context of the preceding analyses.

Defining terms frequently provides us with a logical process in the derivation of answers. In this case, possible relationships between research and curriculum are being examined. A review of recent articles and books that discuss 'curriculum' show that they typically do not specify the writer's meaning of the term. The implied meaning can include course content, lecturing materials and tutoring method, among others. For example, Arya et al (2003) write specifically of the structure and content of accounting programmes, while Entwhistle (2003), in a chapter about 'The Research Curriculum', focuses on the delivery materials used in an accounting programme.

Marsh and Willis (1999) describe the broadening of the meaning of 'curriculum' through the twentieth century while Beyer and Apple (1998) describe a shift in the focus of curriculum theory and practice, away from 'what' and 'why' towards 'how'. Some definitions in texts have become esoteric, including 'Curriculum as *Currere*' (*i.e.,* in its verb form rather than as a noun), 'Curriculum as Complexity', 'Curriculum as Cosmology', 'Curriculum as Conversation', 'Curriculum as Community' (Doll and Gough, 2002), and 'Curriculum as Social Conflict' (Goodson, 1997). Among other texts that appear to identify curriculum as an activity in itself are Kincheloe (1991) with *Curriculum as Social Psychoanalysis: the significance of place* and van Lier (1996) with *The Curriculum as Interaction*. Notice also other uses of this word, such as 'Television is a curriculum that…' (Postman cited in OECD 1994)

Returning to standard definitions that precede moves that broaden the meaning of curriculum (Doll and Gough, 2002), esotericism and assumptions of shared meanings, useful definitions for the purposes of this chapter include:

> *Planned experiences offered to the learner under the guidance of the school. (Wheeler, 1967) and*
> *A plan for achieving intended learning outcomes. (Unruh, 1975).*

However, university students gain much useful knowledge from experiences that are not carefully planned and Unruh's definition is restricted to the plan itself. Marsh and Stafford (1988) provide a table of curriculum definitions and ultimately develop the definition that is adopted both in this chapter and by Marsh and Willis (1999): An interrelated set of plans and experiences which a student completes under the guidance of the school.

Stenhouse (1987) identifies teaching as 'not merely instruction, but the systematic promotion of learning *by whatever means*. And teaching strategy is an important aspect of curriculum…[Teaching strategy] involves developing a policy and putting that policy into practice' (p.24, emphasis added).

Marsh and Stafford (1988, p.3) and Markee (1997, p.21) clarify the place of 'syllabus' as also being subsumed by 'curriculum'.

Marsh and Willis (1999, p.11) also explain that it is both unnecessary and undesirable to separate instruction from curriculum. Instruction, as the means by which defined ends should be achieved, is entirely interwoven with the other aspects of curriculum. With such broad definitions underpinning curriculum studies it is understandable why the word 'curriculum' has been used in a variety

of contexts and appears, in fact, to have a plethora of different meanings. The diverse meanings and uses can be better understood by reference to four levels of curricula. This hierarchy of curricula also assists in the identification of *which* research can inform curriculum development, and *how* that research can impact the curriculum.

The terms used by writers differ but a representative curricula hierarchy is: broad, core, subject, and activity levels (for example, Wheeler (1967) writes of broadfield, core, subject and activity levels). This concept of curricula, written about in the context of primary and secondary education, can be adapted to a tertiary education setting. Broad level.

In the first approach, pre-2005 graduates would be better equipped to work as an accountant in a range of countries, or supervise the preparation of financial statements in the national branches of a multi-national company. The latter approach could examine issues such as the design of an effective control system for the operations of international subsidiaries, and performance evaluation measures for national branch managers.

Both of these kinds of course could have been offered by the same university, possibly with the first in the undergraduate programme and the latter in a postgraduate master's programme. This specific focus of a course arises from decisions about its objective. Further decisions are then made about the particular content of the course. As a case in point, for a management accounting course subject level decisions must be made about incorporating topics such as cost-volume-profit analysis, contemporary performance evaluation methods and inventory management methods. Some topics are best suited to cost analysis courses. Yet some cost analysis topics could also appropriately be incorporated in a subsequent Strategic Management Accounting course. Content decisions therefore need to be made in the interests of minimising the overlap of course content.

Activity Level

The teaching content of a course can be called the *activity* curriculum level. At this level, decisions can cover issues such as the use of case studies, the nature of progressive evaluation, the lecturing style, the content of PowerPoint presentations, and so on. At the activity level the decisions relate to '*how* we try to get the message across'. '*What* message we are trying to get across' is the outcome of decisions at the subject level.

Influences on Curriculum Requirements

Four distinct sources of influence on the requirements of the curricula are those of society in general; select groups; the school (*i.e.*, the institution and its academic staff); and the scholar. It will be seen that each of these can provide a source of research ideas. However, research itself is not presented as an influence on curricula since research ideally acts as one of the media for communication between the influencers and the change agents (curriculum developers at all four levels), often analysing desires, wants and needs and the likely outcomes of alternative options.

Society

Society's needs are always in a state of flux. The problems confronting society change rapidly and recurring issues change in the level of importance that society places on them. Furthermore, society's members become increasingly knowledgeable about problems. Consequently, the demands they place on academia, and the accounting profession, become more sophisticated.

The most general, overarching level of curriculum can be termed *broad*. In the context of university curricula this can be as wide-ranging as the content of a degree programme, or even the programmes offered by the university and their general structure. In business and accounting degrees there are general decisions to be made about the courses that must be studied by students to qualify for the degree. There are usually some compulsory courses and a structure of major and minor sequences of study. These decisions are influenced, to a large extent, by accounting's professional bodies.

Core Level

The content of a major or minor sequence of study, and the offerings within a discipline, can be regarded as the *core* level of curricula. Decisions include: which courses will be offered for study by the faculty, which of these are essential for the sequence, which courses are electives from which students can select the rest of the major/minor sequence, and which courses provide knowledge essential for the study of subsequent courses (prerequisite courses of study).

Subject Level

At the *subject* level, the content of courses is determined. Given a focus on international accounting, for instance, decisions used to be made about whether the content would examine and compare the different accounting approach adopted in a variety of countries—studying the national accounting standards— or whether students should take a managerial perspective that reflected on the impact of accounting on managing international operations.

Hilda Taba (1902–1967)

Although Ernest Hemingway once stated that in each port of the world you could meet at least one Estonian, it is a rare occurrence when the existence and achievements of great personalities originating from this 1 million strong nation are associated with their native country and nation in the minds of their foreign colleagues. In this sense Hilda Taba is not an exception. She is known worldwide as an outstanding American educator and curriculum theorist, but very few know that she was born, brought up and educated in Estonia. Probably, even more surprising is the fact that Taba, belonging to the list of the most outstanding educators of the twentieth century and whose academic work climaxed with the publication of the monograph *Curriculum development: theory and practice* (1962), remained unknown in her native country for decades. So, in spite of the

fact that Taba's approach to curriculum design spread throughout the world and her monograph took an honourable position on the bookshelves of European education libraries in the 1960s, her educational ideas reached Estonian educators only at the end of the 1980s.

The above-mentioned circumstance is one of the many controversial aspects in Hilda Taba's life that evidently played an important role in her development as a scientist and gave a unique colouration to her educational ideas. Another controversy, undoubtedly playing a major role in the formation of Taba's theoretical ideas and thinking, was the collision between German and American educational traditions that she experienced in her studies of pedagogy. For instance, the undergraduate educational preparation that she received at the University of Tartu had a strong disposition towards German didactics and educational philosophy.

However, her subsequent post-graduate studies in the United States of America were strongly influenced by the ideas of progressive education, which she came to admire and which became a cornerstone of her educational thinking.

It remains unknown whether Taba had dreamed of pursuing her academic career in the United States or of returning to Estonia after her post-graduate studies abroad. However, the fact that she competed for the professorship in education at the University of Tartu in 1931 rather points to her intention to bind her working career and life to Estonia. These plans did not comeabout, as she was not selected for this position. But what is even more amazing was that she could not find any other job in Estonia worthy of her qualifications. So, the author of the doctoral dissertation *The dynamics of education: a methodology of progressive educational thought*(1932), which later earned wide recognition among educators, decided to return to North America. This unexpected change in her plans and the subsequent move caused Taba to experience serious difficulties and misery at the beginning of her career. Hilda Taba's road to excellence was in some parts due to chance, her enormous desire to succeed and the favourable conditions for educational research in the United States, and she became one of the brightest stars in the educational constellation of the 1960s.

Nowadays, her work in the field of curriculum design, alongside that of Ralph W. Tyler, belongs to the classics of pedagogy. Several contemporary authors still frequently refer to Hilda Taba's ideas and base their work in the field of curriculum theory and practice on her conceptions developed decades ago (see, for example, articles in the handbooks edited by Shaver, 1991; and Leawy, 1991; and in academic journals by Klarin, 1992; Fraenkel, 1994; Parry et al., 2000). There are over 100 recent articles and monographs referring to the work of Taba in the ERIC database. Furthermore, countless references to her name and educational ideas on the Internet are additional proof that her academic contribution to the field of education has lasting value.

Some ideas about Hilda Taba as a person can be found in Elizabeth H. Brady's (1992) commemorative article. Brady, one of her closest colleagues during the

days of intergroup education projects (1945–51), wrote: 'Taba was very energetic, enthusiastic, active, seemingly tireless; she led life at a tempo which sometimes led to misunderstandings and often wore out friends and staff. She was small in stature, perky in manners and in dress, and always intent on the next thing' (Brady, 1992, p. 9).

Hilda Taba's Childhood and University Studies

The future prominent educator Hilda Taba was born in Kooraste, a small village in the present Põlva county, in southeast Estonia, on 7 December 1902. She was the first of nine children of Robert Taba, a schoolmaster. Hilda was first educated at her father's elementary school, and then at the local parish school.

In 1921, after graduating from Võru High School for Girls, she decided to become an elementary school-teacher. In the autumn of the same year Hilda passed the final examination for elementary teacher certification at the Didactic Seminar of Tartu, but she did not begin work at a primary school. Instead, she became a student of economics at the University of Tartu. Economics, however, did not appeal to Taba and a year later she applied to be transferred to the Faculty of Philosophy where she majored in history and education. As her father's schoolmaster income was too modest for maintaining a big family and supporting Hilda's studies, the tutoring of young students became her main after-school activity and source of income. A dedication in her dissertation to Maria Raudsepp, a pupil she coached during her university studies in Tartu, commemorates this aspect of Taba's biography.

After graduating from the University of Tartu in 1926, Taba had the opportunity to undertake her post-graduate studies in the United States, supported by a grant from the Rockefeller Foundation. Her excellent knowledge of educational subjects acquired at Tartu University made it possible for her to complete a master's degree at Bryn Mawr College in a year. During her studies at Bryn Mawr, she started to visit progressive schools and became interested in the practice of the Dalton Plan (Klarin, 1989). Surveying American educational literature, Taba discovered *Fundamentals of education* by Boyd. H. Bode (1921), a then widely known author and educator in the United States.

Taba was very impressed by Bode's (1873–1953) approach and she grew interested in the philosophy of progressive education. In particular, she enjoyed the child-centredness and the novelty and flexibility of this educational approach. In 1927 she applied for doctoral studies in educational philosophy at Columbia University. During the following five years of studies Taba met many American scientists of world renown, among them the psychologist E.L. Thorndike (1874–1949), the educator and historian P. Monroe (1869–1947), the sociologist G.C. Gounts, and the founder of the Winnetka Plan, C. Washburne (1889–1968). Nevertheless, the person to affect Hilda Taba's educational thinking most was John Dewey (1859–1952)—a philosopher and educator with a global reputation, and one of the initiators of the progressive educational movement whose lectures she attended and whose writings she studied carefully (Isham, 1982; Taba, 1932).

The principal advisor of her doctoral work became William H. Kilpatrick (1871–1965), one of John Dewey's colleagues, known in the history of education as the initiator of the project method. Kilpatrick ended his foreword to Taba's dissertation with prophetic words about its author, stating that 'hard will be that reader to please and far advanced his previous thinking who does not leave this book feeling distinctly indebted to its very capable author' (Kilpatrick, 1932). Kilpatrick was right in assessing the value of this work, and his opinion was proved by the fact that some fifty years later Telegraph Books reprinted the monograph in 1980.

In 1931, having completed her doctoral dissertation, Hilda Taba returned to Estonia in order to apply for the professorship left vacant through the untimely death of Peeter Põld, her professor of education when she studied at the University of Tartu. Unfortunately, Taba was not elected and evidently was badly disappointed. Although she found employment at a college of household economics in Estonia, she decided shortly thereafter to return to the United States.

Taba's Scientific Career in the United States

Once back in the United States, Hilda Taba experienced serious hardships. In the beginning she did not find any employment corresponding to her qualifications, and so she had to undertake some casual jobs. Later, she worked for a wealthy American family coaching their children—an activity she was used to already in Estonia. In addition, her stay in the United States was complicated by the fact that she did not have American citizenship, and because of this she was permanently threatened with deportation by the Department of Immigration. Finally, in 1933.

Taba was given a post as a German teacher, and later on she became the director of curriculum in the Dalton School, in Ohio.

It is of interest to mention that Hilda Taba became involved in educational research by a lucky chance. She was hired just at the start of the Eight-Year Study in which the Dalton School was actively involved. Taba's participation in the study brought her together with Ralph Tyler, who was the head of the field evaluation staff of the study. Tyler was impressed by her devotion to scientific research and by her profound understanding of educational processes, and he hired Taba to form part of the evaluation staff (located at the University of Ohio) as the co-ordinator of the social studies curriculum. In 1939, when the evaluation staff was transferred to the University of Chicago, Taba became the director of the curriculum laboratory, which she headed until 1945.

By the mid-1940s Taba had become a capable and widely recognized educational researcher. She initiated, designed and directed several research projects centred on two major topics: intergroup education (1945–51); and the reorganization and development of social studies curricula in California (1951–67). Hilda Taba also served as a consultant to many local institutions and school districts, and she took part in UNESCO seminars in Paris and Brazil (Harshbarger, 1978).

Studies in the Field of Intergroup Education

Intergroup education became topical in the United States following the Second World War. The reorganization of American industry for the needs of war had caused a significant migration of workers from rural areas to the cities. As a result, major changes in people's way of life and in the composition of their neighbourhoods took place, and these changes contributed to a growing tension. In 1944, quite serious interracial riots took place in Detroit. This was the drop that made the cup run over, and more than 400 public organizations were founded in the United States in response to these events (Klarin, 1989). Taba's research group submitted to the American Council on Education one of many proposals aimed at the investigation of possibilities for increasing the level of tolerance between students from different ethnic and cultural backgrounds. The Intergroup Education Project was accepted and launched in New York City in 1945.

Hilda Taba became its director. The success of the experimental project led to the establishment of the Centre of Intergroup Education at the University of Chicago, which was headed by Taba (1948–51).

The study began with an extensive investigation of the socio-psychological causes of intergroup tensions, and it ended with the approval of school curricula for intergroup tolerance education between students.

These curricula focused on the four main issues related to social life that proved to be essential in the formation of stereotypes and prejudices: (1) differences in the style of family life; (2) differences in the life-styles of the communities; (3) ignorance of American culture; and (4) development of peaceful relations between individuals (Taba et al., 1952). In order to foster better knowledge, understanding and attitudes in these life spheres, special education programmes were developed.

For example, the education programme aimed at the development of personal relations taught children how to handle conflicts without resorting to violence. From today's perspective, intergroup education can be considered as a forerunner of intercultural or multicultural education. When taking a closer look at Taba's work on intergroup education, it is difficult to disagree with Elizabeth H. Brady's comment that one of Taba's 'major contributions was to recognize that social science could provide a strong foundation for education, with sociology, social pedagogy and cultural anthropology in particular illuminating issues in human relations education' (Brady, 1992, p. 8).

STATISTICS AND DEMOGRAPHIC DATA

- In assessing the impact of technology it is unfortunate that no comprehensive national surveys have been done in Australia, at least that this author could locate as of May 2000, however some analysis may be afforded of this issue by observing the following statistics from the Teaching, Learning, and Computing: 1998 National Survey Report #1, by the Centre for Research on Information Technology and

Organizations at the University of California and The University of Minnesota, which was published in February, 1999. While the statistics relate to the United States (research was funded by the U.S., Department of Education) they do reflect a global trend in which Australia is a strong participant.

EQUITY IN INFORMATION TECHNOLOGY

- The resource sharing and collaborative communications extensions provided by new technologies can only do so on a broad scale if the problem of resource equity be addressed. If not, the benefits will only be provided to a few and create more disparity. Resources required include not just hardware and software, but training so that educators can manage these new tasks, and IT support staff to operate and maintain the networks that are developed. The issue of inequitable distribution of these resources lead Brady and Kennedy refer to,"…multiple forms of disadvantage…". It is due to awareness of the realities of disadvantage, that the principle of equality of distribution and access to technological resources becomes a central issue for educators. Teachers, who currently undertake roles of implementers of curriculum, of providers of civics and citizenship education, as progenitors for school review processes and in facilitating aims of continuous improvement, must now vitalise and actualise another aim, that of realising appropriate curriculum development relevant to the collaborative environment of electronically networked information and communication facilities, cooperatively in a shared environment.

- Changes to Queensland curricula such as the Schooling 2010 Project reflect the new mandate for integration of technology through the curriculum. It is important that teachers do not find that they are working towards this alone. It must involve input from all sectors of the community, and particularly those directly concerned with administration and decision making for educational budgetary allocations. It is important that there is no increase in the gulf between the information rich and the information poor, and to do this it is necessary to ensure that all educators, as far as possible, are working towards the incorporation of the tools of technology in a manner that facilitates equitable and broad distribution. Achieving this demands a broad consultative process and the elimination of short-term political agendas.

Rapid change is occurring, inequitably, with difference of opinion on how best to respond and what solutions to implement. But one thing that perhaps can be agreed to by all is that education does need to adapt to the changes at least as they are occurring. Current educational philosophies support processes which facilitate students' development of willingness to experiment, comprehension of abstract concepts, advanced skills of problem solving, reasoning, awareness of social justice and ecological-sustainability issues, all within a framework of integration of technology in cross-curricular activities.

I believe that the changes we witness in technology mean that these processes have become even more valuable. I suggest that the most needed practical application for knowledge gained at school, in the industrial and technological 'real world', appears to be the ability to manifest higher-order skills within a context of thoughtful social awareness. While a background in basics remains important...what is basic is changing.

Pioneers in the use of computers and other technology in education have much to teach us about integrating technology into our classrooms. It is through their expertise, experience, observation, research, and discussion that we can learn how to best make use of the power of today's technology to teach Pioneers in the use of computers and other technology in education have much to teach us about integrating technology into our classrooms. It is through their expertise, experience, observation, research, and discussion that we can learn how to best make use of the power of today's technology to teach our students. Technology in the classroom is nothing new to education. In the past, computers were used mainly as a tool to teach basic skills through the use of "drill and kill" software. There is a place for those programmes that focus on basic skills, but educators are realizing the potential that computers have to help improve their students' education.

CHECK YOUR KNOWLEDGE

Directions: Evaluate the accuracy of each statement below.
Place a T (for True) or an F (for False) in the spaces provided.
- The use of technology in the classroom encourages the traditional role of teacher as lecturer.
- The use of technology in the classroom supports teachers in encouraging students to use higher-order thinking skills.
- Technology can be used to enhance learning when teachers put the technology into students' hands and challenge them to apply it to solve problems and complete projects.
- Even when the teacher acts as coach, sometimes the teacher needs to share important pre-knowledge before a project is presented to students.
- The term information literate is used to describe a student or teacher who looks to the media for solutions to problems.
- Technology and popular culture have slowed down the delivery of information and decreased the quantity of information available to students.
- A teacher who seeks to incorporate technology into his/her classroom to develop information literate students must provide interesting and relevant projects, questions, and problems for students to undertake.
- Computers are not teachers in and of themselves.
- Computers should be integrated into the curriculum as much as possible.
- The teacher as coach role also includes differentiating the lesson for students of varied abilities.

TEACHER AS COACH

The modern-day classroom is now moving beyond utilizing computers to simply teach students basic skills. In a research report on media and technology, Thomas Reeves made a distinction on the use of technology by clarifying the difference between "learning from" and "learning with" technology. Learning from technology implies the computer is acting as a tutor delivering instruction on basic skills. Traditionally, this has been the way technology was used in the classroom. Learning with computers implies that the computer is a tool to solve problems where students must gather, organize, and analyse problems.

This approach supports constructivist teachings and the idea that technologies are cognitive tools that can be used to expand on student learning. With the expectation that students be information literate, educators need to spend more time designing lessons where students are learning with computers rather than from them. Using the computer as a tool provides students with the opportunity to develop and use their higher-level thinking skills to solve problems that are relevant to their daily lives. As we move towards the idea of learning with technology, teachers are taking on a new role in the classroom. Hobbs (2006) points out in addition to simply bringing students access to online sources, such as online newspapers, magazine articles, and blogs, K–12 educators are now "involving students in creating their own messages using visual, electronic and digital media tools".

Technology lends itself to a new role for the teacher: that of facilitator and coach. Replacing the traditional model of a teacher as a lecturer, the teacher instead presents students with challenging real-life problems and the technology tools to solve them (Means and Olson, 1994). It is significant that as teachers take on the role of coach, students also take on a new role: that of active participants. In a research study that focused on project-based learning with multimedia, participant teachers reported the shift in their roles in the classroom. They found they were less likely to lecture and more likely to facilitate or coach students. A teacher acting as a coach can now join his/her students in the learning process, encouraging them to use technology tools to help overcome any obstacles they may face when trying to find a solution. In the end, the teacher helps students draw conclusions and assess their learning. In these activities, the teacher encourages students to use higher-order thinking skills with scaffolding provided through the highly motivational technology tools. "Teaching higher-order thinking skills involves not so much conveying information as conveying understanding.

Students learn concepts and then attempt to apply them to various problems, or they solve problems and then learn the concepts that underlie the solutions". The use of technology supports teachers in this lofty goal. The teacher as coach model is not new. Most likely you have assumed this role when you have challenged students to solve problems or complete interesting projects. You likely already know that cognitive research shows that learning improves when students are actively involved in learning, working in groups, frequently interacting and receiving feedback, and seeing the connections to real life. What

might be new to you is what experts like Jamie McKenzie have discovered over the past decade—the teacher as coach, computer as a tool model is the best methodology for effective integration of technology into the classroom (McKenzie, 2000). In other words, technology is best used to enhance learning when teachers put the technology into students' hands and challenge them to apply it to solve problems and complete projects.

- Designs projects and/or problems for students to tackle
- Asks thought-provoking, open-ended questions to guide students
- Provides tools and teaches students how to use them to solve problems
- Modifies lessons for higher-ability and lower-ability students
- Forms cooperative groups; willing to change direction of lesson based on student interest
- Evaluates skills, effort, and knowledge using a combination of assessment devices
- Leads students through self assessment processes
- Presents information lecture-style
- Demonstrates skills and directs students to mimic the steps
- Shows students how to solve problems
- Leads students to one "right" answer
- Favours having students work on their own
- Evaluates students almost exclusively with paper-and-pencil tests

A WORD ABOUT LECTURES

Occasionally, teachers still need to share information with students in the traditional lecture-style. Oftentimes, the teacher needs to share important pre-knowledge before a project is presented to students. The main idea of the teacher as coach model is to ensure that a great deal of the instruction is student-centered, with students being active problem solvers and learners. This is why technology is so exciting. Technology lends itself to project- or problem-based lessons.

HELPING TO CREATE INFORMATION LITERATE STUDENTS

Part of the teacher as coach model is helping to create information literate students. The term information literate is used to describe a student or teacher who knows how to question, think independently, invent, research, and problem solve. "As America moves towards an information society, critical thinking skills, problem solving skills, and competence in information literacy in order to process information become increasingly more important for all students" ("Information Literacy in an Information Society," 1994,. Technology and popular culture have accelerated the delivery of information and increased the quantity of information available to students. Information literate students do not simply regurgitate information. They do not immediately believe what they read. They skim, discriminate, question, analyse, and synthesize information. This is why it is so important that we create learning situations in which students are not merely instructed, lectured, or shown how to do something. Internet

researcher Dan Tapscott notes that while much of the world is controlled by adults, with kids as passive spectators, the Internet gives students an opportunity to not just observe, but also to participate (Tapscott, 1998). We must prepare students for an information-saturated world, a world where adaptable thinking and solid problem- solving skills are paramount for success and, in some cases, survival. As a teacher, you have the unique opportunity to provide your students with opportunities to practice questioning and problem solving, as well as using technology tools to solve problems, answer questions, and communicate. In this way, you will help to create students who are information literate and, eventually, citizens who can navigate and succeed in our increasingly complex world.

QUESTIONS, PROBLEMS, PROJECTS— MEANINGFUL USES OF TECHNOLOGY

In the past, the teacher and texts were the only sources of knowledge for any given content area. Technology brings more exciting, up-to-date, and diverse materials right into the classroom (Hawkins, 1997). A teacher who seeks to integrate technology into his/her classroom to develop information literate students must provide interesting, relevant projects, questions, and problems for students to tackle. So what are project-based or problem-based lessons that engage students in real-life tasks and build critical thinking skills? Such lessons begin with a question or problem that is meaningful to students because it will send them on an interesting, challenging investigation.

Examples of questions and problems include:
- What pattern do you see in the multiples of six?
  (3rd grade)
- How are the oral traditions of the Ashanti from Africa and the Pawnee Native Americans similar and different? (5th grade)
- Why did kings and queens live in castles?
  (Kindergarten)
- Does tap water have the same pH level and contain the same metals in different cities in the
- United States? (6th–8th grade)
- What is your opinion regarding the U.S., Supreme Court's ruling in favour of George W. Bush in the 2000 Presidential Election? (8th grade)
- How many students in our classroom like chocolate chip ice cream? Rocky Road? Mint chip?
  (1st grade)

It is important to note that all of the above questions were formed to address academic standards and can be answered (or conclusions can be presented) with the help of technology. So, how can students use technology to help answer questions like those above?

Here are some examples of projects involving technology:
- Brainstorm the answer to a question using graphical organizing software.
- Create a collective class database to collect information on a history, science, math, or language arts topic.

- Discover patterns in multiples of numbers using a calculator.
- Research literature, ancient and modern cultures, scientific discoveries, historical events, mathematical history, famous artworks, geological data, *etc.*, using the Internet.
- Participate in real scientific research using the Internet.
- Communicate (using e-mail) with other classrooms across the United States and the world to collect scientific or sociological data.
- Create newsletters, invitations, and posters using word processing software to synthesize and apply knowledge and ideas.
- Construct a persuasive multimedia presentation as the culmination of a research project.
- Use a spreadsheet programme to organize economic data and create graphs to compare that data. In the next section, you will see an example of a new teacher directing her students in a project-based lesson that incorporates technology as a tool used to complete the project.

TEACHER AS COACH IN A LESSON INTEGRATING TECHNOLOGY

The Scenario

Sophie, a new teacher, wishes to address some of the technology and science standards her district expects her to teach her fifth-grade students. She has two computers in her classroom and access to 20 more computers in a computer lab. Each computer in her classroom and in the lab has word processing, spreadsheet, multimedia, desktop publishing, and drawing software programmes, as well as Internet access.

The Project

Realizing that being a new teacher is a challenge by itself, Sophie wisely decides to borrow a lesson idea from another teacher. In this case, she goes online and finds a standards-based lesson on an education website. The lesson poses the following question to students: How is the geology of Earth similar to or different from the geology of the moon? Students assume the roles of either geologists or astrogeologists to investigate the physical characteristics of Earth and the moon.

Students are to work in pairs and use their own observations, the Internet, and books to collect their information. They are given a chart which directs them to record what they find and sources of information they consulted. Once they have collected their information, students meet with a group that conducted the opposite research (*i.e.,* the geologists meet with the astrogeologists). At these meetings they discuss what is similar and different about the geology of Earth and the moon and record the information from the other group on the backs of their papers. Then, they are instructed to create a table in a word processing document and then a Venn diagram on paper comparing the physical characteristics of Earth and the moon

Days one Through Five of the Project

Before beginning, Sophie decides to tweak the lesson a little to fit the unique needs of her students. She decides, for example, that her students need to know a little more about conducting research on the Internet before the lesson. She spends day one in the computer lab showing students how to use a kid-friendly search engine to find information. She uses a computer projector attached to the teacher's computer to show students the steps.

Then Sophie gives them time to practice on their own. In the computer lab on day two, Sophie asks the students to recall from previous lessons the definitions of the terms geology and physical characteristics. She then uses the computer projector to show the students pictures of Earth and the moon. Next, Sophie asks the students to spend time in small groups discussing and writing down their hypotheses for the question: How is the geology of Earth similar to or different from the geology of the moon? Then she assigns the pairs of students to either the role of geologist or astrogeologist. She pairs students who are more familiar with technology with those who are less experienced.

She asks what the differences are between geologists and astrogeologists; students discuss this in small groups before offering suggestions. She tells students to use the Internet to find the physical characteristics of either Earth or the moon, depending on their assignment. While they are looking for information, Sophie walks around the classroom, listens to the students talking and working, and peeks at their computer screens. She assists students by talking them through any obstacles. She provides information when necessary to scaffold the lesson for struggling students. However, she resists the temptation to lead them directly to the answers.

On day three back in the classroom, Sophie provides geology books of varied complexity to students and presses them to find more physical characteristics of Earth or the moon. For those students with a complete list, she challenges them to choose one physical characteristic, predict how it was formed, and then find the answer using a classroom computer or a book. After students are given a little time, Sophie then directs pairs of students to meet and share their research. She explains that this is what scientists do: they share their research in order to further everyone's knowledge and build upon existing knowledge.

The pairs then exchange their research. On day four back in the computer lab, Sophie uses the computer projector to briefly remind her students how to create a table in a word processing document, which is a skill her students had learned in a previous lesson. The students are creating tables to display their research and the research of the other group. On day five, students work by themselves to create Venn Diagrams on paper, comparing and contrasting the physical characteristics of Earth and the moon. Sophie assists students who need help to complete their diagrams. As the students finish, they meet with other students who are finished to discuss their findings. Finally, students explain in writing how their original hypotheses were correct or incorrect. They are

also told to think of reasons why the physical characteristics of Earth and the moon are similar or different. Students with time to spare are encouraged to use the classroom computers and books to explore this final question further. When everyone is finished, the class comes together to discuss that final question.

COMPUTER AS THE TOOL

In the lesson above, you can see that Sophie did not rely on the computers to teach her students. She did not sit them down in front of the computers and have the students use a software programme to learn facts or skills Computers are not teachers. When technology is used as a tool, the students and teachers are in control of their learning and the direction their learning takes. Using computers as a tool allows students to use higher-level thinking skills to solve problems. The power of technology lies with how the teacher uses it. As in Sophie's classroom, the computer acted as a tool for students to explore and gather information to support a problem-based project. Think of a computer as you would a pencil, ruler, compass, or microscope. We do not expect these implements to teach skills or knowledge to students. We use them with students as tools to help students make new discoveries and solve problems. Software that facilitates critical thinking and higher order thinking works best with the teacher as coach, computer as tool model. Using these tools helps students to question, plan, gather, analyse, and report. Examples of these software programmes include databases, word processors, spreadsheets, multimedia presentation programmes, publishing programmes, and graphic organizing programmes. Of course, there is an occasional place for allowing students to use computer programmes that help reinforce learning already taking place in the classroom.

Instructional software programmes that help students practice math facts or new vocabulary can be helpful when used now and then. Some high quality programmes, like The Logical Journey of the Zoombinis, can also lead students through problem-solving exercises that involve logic and reasoning. When planning a lesson incorporating software, remember that teaching students how to use the programme is not enough. Think about why the students are using the programme. What project can they accomplish? What question or problem can they solve when they use the programme to create a product? In the above lesson example, students first used the Internet to collect information and help answer a question. Then they used a word processing programme to create a table to compare their research to another group's research

COMPUTERS INTEGRATED, NOT ISOLATED

Related to the above idea that computers are tools and not teachers is the important idea that technology skills should not be taught in isolation. Computers should be integrated into the curriculum as much as possible. They are best used by students to solve real-life problems and to complete meaningful projects (Eisenberg and Johnson, 2002). A computer lab full of computers running

instructional software programmes, where students go regularly to do drill-and-kill exercises is not a good use of such powerful tools. Research suggests that when technology is integrated throughout the curriculum, students will not only learn technology skills but also content knowledge. Integrating computers throughout the curriculum enables students to develop the skills needed to be successful in the workplace, including locating and accessing information, organizing data, and making persuasive arguments.

To set up a computer lab with a lab instructor who teaches computer skills in isolation from academic standards or meaningful projects is not an effective use of technology."How can anyone justify spread sheeting divorced from real questions as a worthwhile endeavor? Or Power Pointing? Or Internetting?".In the same vein, do not be drawn in (or let your principal or lab coordinator be drawn in) by the temptation to purchase and follow a sequential, self-contained, isolated technology curriculum. Such programmes waste money and academic time and do not encourage students to think critically. An analogy would be setting up a science tool lab, where students spend one hour per week learning how to use microscopes, Bunsen burners, pipettes, *etc.*, without actually making connections to real scientific issues.

Computers, just like microscopes, should be used for investigations, analysis, data collection, and problem solving in the context of a meaningful question, problem, or project. If your school is lucky enough to have a dedicated computer lab instructor, then he/she should work closely with the teacher to deliver lessons in the computer lab that are intimately tied to what you are doing in the classroom. Work with your school's computer lab instructor to create lessons that teach computer skills as a means to completing a project or creating a product.

TO DIFFERENTIATE WITH TECHNOLOGY IN A LESSON

The teacher as coach role also includes differentiating the lesson for students of varied abilities. Most classes have a wide variety of skill ranges, whether related to content skill or technology skill. Recognizing that students have differing abilities in technology and problem solving, the teacher can modify the lesson appropriately for individual students. There are many ways to differentiate instruction to meet the varied ability levels of students. Here we focus on the methods that are relevant to projects that incorporate technology.

USE STUDENT GROUPING

In the scenario on the previous pages, Sophie grouped students in different ways during the lesson. Working in pairs or teams on challenging projects is an excellent way to promote learning and higher-order thinking. When using the tools of technology to research or solve problems together, students will discuss, brainstorm, build on each other's ideas, and find solutions. This collaboration is teaching them higher-order thinking skills and the value of working together and will prepare them for the world outside of school. Having computers in the

classroom actually promotes collaboration. It has been found that students with access to computers actually work together more than in classrooms without computers. The teacher as coach role means that the teacher strategically plans the groups for any technology project. At times, students of similar ability are paired or included in the same group, but more often, students of mixed ability are grouped together.

Another way to differentiate using student groupings is to have students work in pairs or teams for part of a project or assignment but then work individually for other parts of the assignment. For example, students can work together to research and collect data but work by themselves to organize or display the data. Similarly, some students can work in teams and others by themselves on a particular task, depending on their abilities to complete the task alone.

MONITOR READING ABILITY

In the teacher as coach role, the teacher needs to monitor the reading ability of various students who are engaged in technology research. For example, if students are using the Internet to research a subject, you wouldn't want your lowest readers struggling through a university- level Ph.D. dissertation that they found online. The teacher should gently guide students to find research that is at the appropriate reading and age level. Another way to differentiate is to provide resources of varied reading and complexity levels. Seek out books and websites of varying reading levels and complexity before beginning a project to provide the necessary resources to students.

DISPLAY OF INFORMATION FOUND

Technology allows students to search for and display information in different ways. One group may decide to summarize their information by using a word-processing programme. Another group may decide to create a chart using a spreadsheet. Another group may decide to make a slide show presentation of their information. The teacher as coach can encourage creativity in the display of information. This teacher as coach role also applies to making sure students understand the ethics involved in using copyrighted material in their display of researched information.

EXTEND THE LESSON FOR HIGHER-ABILITY LEVELS

A great way to challenge higher-ability students is to extend a lesson with an open-ended question. In the example lesson above, Sophie extends the lesson for students who have completed their assignments by posing the question: Why are the physical characteristics of Earth and the moon similar or different? Students are encouraged to use books or a classroom computer to explore this question while the rest of the class finishes the original task. The next chapter outlines the national technology education standards that provide the framework for student learning using technology.

PRIORITIES AND RESOURCES IN CURRICULUM DESIGN

Scope: Describes the breadth and depth of the content to be included at any given level of instruction.

Integration: Describes the horizontal relationships among the various content topics and themes that students encounter at any given level of instruction.

Sequence: Describes the vertical relationships among the various content topics and themes that will help ensure cumulative and continuous learning. Smith, Stanley, and Shores describe four sequencing strategies.

- Simple to complex (inductive)
- *Prerequisite:* Some parts must be learned before other parts can be learned.
- *Whole to part:* General to specific (deductive)
- *Chronological:* Sequence reflects occurrence in real world.

Continuity: That part of sequencing that deals with the repetition of critical curriculum components to ensure their continual development. Bruner's "spiral curriculum," where skills are developed and then further developed at a later time by taking students to greater depth and/or breadth.

Articulation and Balance: Describes the interrelatedness of the components of curriculum design. Most frequently neglected aspect of curriculum design.

SUBJECT-CENTERED CURRICULUM DESIGNS

Separate Subjects:
1. Oldest and most common curriculum design.
2. Each subject is taught in relative isolation (U.S., History, English History, *etc.*) and, typically, progresses from simple to complex or in chronological order.
3. Teacher dominated and verbally oriented
4. Little, if any, attention to the needs or interests of the students. They are there to learn the content.
5. The greater the need for in-depth study (the higher the grade level), the greater the appropriateness of a subject-centered design.

DISCIPLINARITY

1. An off-shoot of the separate subjects design.
2. Groups separate subjects into larger disciplines (such as Social Science or Physical Science) which, according to theorists such as Bruner, have their own structure and mode of inquiry.
3. Learning the structure and mode of inquiry of each discipline, facilitates the specialization of knowledge.
4. Each course becomes a prerequisite for the following course as though each student was going to become a specialist in a given discipline.
5. Too little time in the school day to account for every discipline or knowledge specialty. "Alfred North Whitehead observed the "Lack of time is the rock upon which the fairest educational schemes are wrecked."

CORRELATION

1. Attempts to develop certain common relationships between or among two or more subjects while still retaining the usual subject divisions. For example, A literature course might be organized to relate to the work a history class through a:
   — Chronological-historical approach While a particular historical period is being studied in a history class, the literature written during that period could be studied in a literature class.
   — Thematic approach While themes such as man's inhumanity to man, or the effects of the Industrial Revolution are studied in a history class, literature reflecting these themes could be studied in a literature class.
   — Problems approach While the social problems of a particular period are studied in a history class, literature demonstrating social protest or concern could be studied in a literature class.
2. Least disruptive of the traditional curriculum.
3. Usually requires two or more teachers.
4. J. Lloyd Trump, Associate Secretary of the National Association of Secondary School Principals in 1956, introduced the term "team teaching"
   a. Two or more teachers would cooperate in planning, instruction, and evaluation
   b. Students would be grouped for special purposes
      (1) large group instruction (40 percent of a student's time or about 12 hours per week)
      (2) small group discussion (20 percent of the time or about six hours per week)
      (3) independent study (40 percent of the time or about 12 hours per week)
   c. Flexible daily schedule, sometimes built around 15 minute modules that could be linked to form periods of varying lengths of time (modular scheduling).
   d. Use of teacher aides
   e. Recognition and utilization of individual teacher talents (differentiated staffing).
   f. Use of space and media appropriate to the purpose and content of instruction.

BROAD FIELDS OR FUSION

1. Attempts to develop some degree of synthesis or unity for one or more branches of knowledge such as the Social Sciences or the Fine Arts, as does Disciplinarity.
2. Sometimes creates new "broad fields" such as Ecology (Chemistry, Biology, Geography, Economics, Agriculture, Economics, Sociology, *etc.*), or the Humanities (Drama, Literature, History, Philosophy, Music, Visual Arts, Architecture)

3. The intention is to make a meaningful whole out of separate subjects. However, time constraints often mean that the approach provides only a survey of each of the subjects contributing to the "broad field."
4. Usually taught by one teacher.

CHILD-CENTERED CURRICULUM DESIGNS

A. Based on the belief that virtually all school learning activities should be centered around the felt needs and interests of the child.
B. Activity or Experience Curriculum
   1. Proposed at the turn of the century.
   2. Major objective was child growth through active experience that was visible to the naked eye.
   3. Francis Parker experimented with an "activity curriculum" in Quincy, Mass.
      a. There were no subjects at all at the first or second grades. The curriculum at these levels was based on "centers of interest" which changed from year to year.
      b. There was no pre-planning of the curriculum.
   4. Major problems
      a. No way to objectively assess student progress towards skills students needed to function in the society.
      b. No Horizontal or vertical structure. No way of determining what will be taught or when. No curriculum
C. Core Curriculum
   1. Proposed in the 1920s and 30s by Dewey and other Progressivists.
   2. The faculty is responsible for preplanning the content, resources, and activities that are organized around key societal problem areas and issues—arranged in an articulated sequence through the various grade levels.
   3. Students are typically grouped heterogeneously in order to demonstrate democratic values and ideals in the classroom and cooperation is valued more highly than competitiveness.
   4. Typical methodology is group work and reflective thinking.
   5. Major problems
      a. Often deals with the moral positions particularly as those positions bear on the resolution of social problems and issues.
      b. Usually teachers have to develop their own instructional materials since there are few texts or instructional materials appropriate for particular cores, available commercially.
      c. Requires extensive resource materials since solving real problems (experience or social) requires the use of methods and materials from several subject fields.

RESOURCES FOR CURRICULUM TRANSACTION—COMPUTER AND THE INTERNET

Although mechanical examples of computers have existed throughout history, the first resembling a modern computer were developed in the mid-20th century (1940–1945). The first electronic computers were the size of a large room, consuming as much power as several hundred modern personal computers (PC). Modern computers based on tiny integrated circuits are millions to billions of times more capable than the early machines, and occupy a fraction of the space. Simple computers are small enough to fit into a wristwatch, and can be powered by a watch battery. Personal computers in their various forms are icons of the Information Age, what most people think of as a "computer", but the embedded computers found in devices ranging from fighter aircraft to industrial robots, digital cameras, and toys are the most numerous.

The ability to store and execute lists of instructions called programmes makes computers extremely versatile, distinguishing them from calculators. The Church–Turing thesis is a mathematical statement of this versatility: any computer with a certain minimum capability is, in principle, capable of performing the same tasks that any other computer can perform. Therefore computers ranging from a personal digital assistant to a supercomputer are all able to perform the same computational tasks, given enough time and storage capacity.

HISTORY OF COMPUTING

The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued to be used in that sense until the middle of the 20th century. From the end of the 19th century onwards though, the word began to take on its more familiar meaning, describing a machine that carries out computations.

The history of the modern computer begins with two separate technologies—automated calculation and programmability—but no single device can be identified as the earliest computer, partly because of the inconsistent application of that term. Examples of early mechanical calculating devices include the abacus, the slide rule and arguably the astrolabe and the Antikythera mechanism (which dates from about 150–100 BC). Hero of Alexandria (c. 10–70 AD) built a mechanical theater which performed a play lasting 10 minutes and was operated by a complex system of ropes and drums that might be considered to be a means of deciding which parts of the mechanism performed which actions and when. This is the essence of programmability.

The "castle clock", an astronomical clock invented by Al-Jazari in 1206, is considered to be the earliest programmable analog computer. It displayed the zodiac, the solar and lunar orbits, a crescent moon-shaped pointer travelling across a gateway causing automatic doors to open every hour, and five robotic

musicians who played music when struck by levers operated by a camshaft attached to a water wheel. The length of day and night could be re-programmed to compensate for the changing lengths of day and night throughout the year.

The end of the Middle Ages saw a re-invigoration of European mathematics and engineering. Wilhelm Schickard's 1623 device was the first of a number of mechanical calculators constructed by European engineers, but none fit the modern definition of a computer, because they could not be programmed.

In 1801, Joseph Marie Jacquard made an improvement to the textile loom by introducing a series of punched paper cards as a template which allowed his loom to weave intricate patterns automatically. The resulting Jacquard loom was an important step in the development of computers because the use of punched cards to define woven patterns can be viewed as an early, albeit limited, form of programmability. It was the fusion of automatic calculation with programmability that produced the first recognizable computers. In 1837, Charles Babbage was the first to conceptualize and design a fully programmable mechanical computer, his analytical engine. Limited finances and Babbage's inability to resist tinkering with the design meant that the device was never completed.

In the late 1880s Herman Hollerith invented the recording of data on a machine readable medium. Prior uses of machine readable media, above, had been for control, not data. "After some initial trials with paper tape, he settled on punched cards..." To process these punched cards he invented the tabulator, and the key punch machines. These three inventions were the foundation of the modern information processing industry. Large-scale automated data processing of punched cards was performed for the 1890 United States Census by Hollerith's company, which later became the core of IBM. By the end of the 19th century a number of technologies that would later prove useful in the realization of practical computers had begun to appear: the punched card, Boolean algebra, the vacuum tube (thermionic valve) and the teleprinter.

During the first half of the 20th century, many scientific computing needs were met by increasingly sophisticated analog computers, which used a direct mechanical or electrical model of the problem as a basis for computation. However, these were not programmable and generally lacked the versatility and accuracy of modern digital computers.

George Stibitz is internationally recognized as a father of the modern digital computer. While working at Bell Labs in November of 1937, Stibitz invented and built a relay-based calculator he dubbed the "Model K" (for "kitchen table", on which he had assembled it), which was the first to use binary circuits to perform an arithmetic operation. Later models added greater sophistication including complex arithmetic and programmability.

A succession of steadily more powerful and flexible computing devices were constructed in the 1930s and 1940s, gradually adding the key features that are seen in modern computers. The use of digital electronics (largely invented by Claude Shannon in 1937) and more flexible programmability were vitally

important steps, but defining one point along this road as "the first digital electronic computer" is difficult (Shannon 1940). Notable achievements include:

- Konrad Zuse's electromechanical "Z machines". The Z3 (1941) was the first working machine featuring binary arithmetic, including floating point arithmetic and a measure of programmability. In 1998 the Z3 was proved to be Turing complete, therefore being the world's first operational computer.
- The non-programmable Atanasoff–Berry Computer (1941) which used vacuum tube based computation, binary numbers, and regenerative capacitor memory. The use of regenerative memory allowed it to be much more compact then its peers (being approximately the size of a large desk or workbench), since intermediate results could be stored and then fed back into the same set of computation elements.
- The secret British Colossus computers (1943), which had limited programmability but demonstrated that a device using thousands of tubes could be reasonably reliable and electronically reprogrammable. It was used for breaking German wartime codes.
- The Harvard Mark I (1944), a large-scale electro-mechanical computer with limited programmability.
- The U.S., Army's Ballistics Research Laboratory ENIAC (1946), which used decimal arithmetic and is sometimes called the first general purpose electronic computer (since Konrad Zuse's Z3 of 1941 used electromagnets instead of electronics). Initially, however, ENIAC had an inflexible architecture which essentially required rewiring to change its programming.

Several developers of ENIAC, recognizing its flaws, came up with a far more flexible and elegant design, which came to be known as the "stored programme architecture" or von Neumann architecture. This design was first formally described by John von Neumann in the paper *First Draft of a Report on the EDVAC*, distributed in 1945. A number of projects to develop computers based on the stored-programme architecture commenced around this time, the first of these being completed in Great Britain. The first to be demonstrated working was the Manchester Small-Scale Experimental Machine (SSEM or "Baby"), while the EDSAC, completed a year after SSEM, was the first practical implementation of the stored programme design. Shortly thereafter, the machine originally described by von Neumann's paper—EDVAC—was completed but did not see full-time use for an additional two years.

Nearly all modern computers implement some form of the stored-programme architecture, making it the single trait by which the word "computer" is now defined. While the technologies used in computers have changed dramatically since the first electronic, general-purpose computers of the 1940s, most still use the von Neumann architecture.

Computers using vacuum tubes as their electronic elements were in use throughout the 1950s, but by the 1960s had been largely replaced by transistor-

based machines, which were smaller, faster, cheaper to produce, required less power, and were more reliable. The first transistorised computer was demonstrated at the University of Manchester in 1953. In the 1970s, integrated circuit technology and the subsequent creation of microprocessors, such as the Intel 4004, further decreased size and cost and further increased speed and reliability of computers. By the 1980s, computers became sufficiently small and cheap to replace simple mechanical controls in domestic appliances such as washing machines. The 1980s also witnessed home computers and the now ubiquitous personal computer. With the evolution of the Internet, personal computers are becoming as common as the television and the telephone in the household.

Modern smartphones are fully-programmable computers in their own right, and as of 2009 may well be the most common form of such computers in existence.

INTERNET

The **Internet** is a global network of interconnected computers, enabling users to share information along multiple channels. Typically, a computer that connects to the Internet can access information from a vast array of available servers and other computers by moving information from them to the computer's local memory.

The same connection allows that computer to send information to servers on the network; that information is in turn accessed and potentially modified by a variety of other interconnected computers.

A majority of widely accessible information on the Internet consists of inter-linked hypertext documents and other resources of the World Wide Web (WWW). Computer users typically manage sent and received information with web browsers; other software for users' interface with computer networks includes specialized programmes for electronic mail, online chat, file transfer and file sharing.

The movement of information in the Internet is achieved via a system of interconnected computer networks that share data by packet switching using the standardized Internet Protocol Suite (TCP/IP). It is a "network of networks" that consists of millions of private and public, academic, business, and government networks of local to global scope that are linked by copper wires, fiber-optic cables, wireless connections, and other technologies.

TERMINOLOGY

The terms Internet and World Wide Web are often used in every-day speech without much distinction. However, the Internet and the World Wide Web are not one and the same. The Internet is a global data communications system. It is a hardware and software infrastructure that provides connectivity between computers. In contrast, the Web is one of the services communicated via the Internet. It is a collection of interconnected documents and other resources, linked by hyperlinks and URLs.

The term the Internet, when referring to the Internet, has traditionally been treated as a proper noun and written with an initial capital letter. There is a trend to regard it as a generic term or common noun and thus write it as "the internet", without the capital.

HISTORY

Creation: The USSR's launch of Sputnik spurred the United States to create the Advanced Research Projects Agency, known as ARPA, in February 1958 to regain a technological lead. ARPA created the Information Processing Technology Office (IPTO) to further the research of the Semi Automatic Ground Environment (SAGE) programme, which had networked country-wide radar systems together for the first time. J.C.R. Licklider was selected to head the IPTO, and networking as a potential unifying human revolution. Licklider moved from the Psycho-Acoustic Laboratory at Harvard University to MIT in 1950, after becoming interested in information technology. At MIT, he served on a committee that established Lincoln Laboratory and worked on the SAGE project. In 1957 he became a Vice President at BBN, where he bought the first production PDP-1 computer and conducted the first public demonstration of time-sharing.

At the IPTO, Licklider got Lawrence Roberts to start a project to make a network, and Roberts based the technology on the work of Paul Baran, who had written an exhaustive study for the U.S., Air Force that recommended packet switching (as opposed to circuit switching) to make a network highly robust and survivable.

After much work, the first two nodes of what would become the ARPANET were interconnected between UCLA and SRI (later SRI International) in Menlo Park, California, on October 29, 1969. The ARPANET was one of the "eve" networks of today's Internet.

Following on from the demonstration that packet switching worked on the ARPANET, the British Post Office, Telenet, DATAPAC and TRANSPAC collaborated to create the first international packet-switched network service. In the UK, this was referred to as the International Packet Switched Service (IPSS), in 1978. The collection of X.25-based networks grew from Europe and the US to cover Canada, Hong Kong and Australia by 1981. The X.25 packet switching standard was developed in the CCITT (now called ITU-T) around 1976.

X.25 was independent of the TCP/IP protocols that arose from the experimental work of DARPA on the ARPANET, Packet Radio Net and Packet Satellite Net during the same time period. Vinton Cerf and Robert Kahn developed the first description of the TCP protocols during 1973 and published a paper on the subject in May 1974. Use of the term "Internet" to describe a single global TCP/IP network originated in December 1974 with the publication of RFC 675, the first full specification of TCP that was written by Vinton Cerf, Yogen Dalal and Carl Sunshine, then at Stanford University. During the next nine years, work proceeded to refine the protocols and to implement them on a wide range of operating systems.

The first TCP/IP-based wide-area network was operational by January 1, 1983 when all hosts on the ARPANET were switched over from the older NCP protocols. In 1985, the United States' National Science Foundation (NSF) commissioned the construction of the NSFNET, a university 56 kilobit/second network backbone using computers called "fuzzballs" by their inventor, David L. Mills. The following year, NSF sponsored the conversion to a higher-speed 1.5 megabit/second network. A key decision to use the DARPA TCP/IP protocols was made by Dennis Jennings, then in charge of the Supercomputer programme at NSF.

The opening of the network to commercial interests began in 1988. The US Federal Networking Council approved the interconnection of the NSFNET to the commercial MCI Mail system in that year and the link was made in the summer of 1989. Other commercial electronic e-mail services were soon connected, including OnTyme, Telemail and Compuserve. In that same year, three commercial Internet service providers (ISP) were created: UUNET, PSINet and CERFNET. Important, separate networks that offered gateways into, then later merged with, the Internet include Usenet and BITNET. Various other commercial and educational networks, such as Telenet, Tymnet, Compuserve and JANET were interconnected with the growing Internet.

Telenet (later called Sprintnet) was a large privately funded national computer network with free dial-up access in cities throughout the U.S., that had been in operation since the 1970s. This network was eventually interconnected with the others in the 1980s as the TCP/IP protocol became increasingly popular.

The ability of TCP/IP to work over virtually any pre-existing communication networks allowed for a great ease of growth, although the rapid growth of the Internet was due primarily to the availability of commercial routers from companies such as Cisco Systems, Proteon and Juniper, the availability of commercial Ethernet equipment for local-area networking, and the widespread implementation of TCP/IP on the UNIX operating system.

GROWTH

Although the basic applications and guidelines that make the Internet possible had existed for almost two decades, the network did not gain a public face until the 1990s. On 6 August 1991, CERN, a pan European organisation for particle research, publicized the new World Wide Web project. The Web was invented by English scientist Tim Berners-Lee in 1989.

An early popular web browser was ViolaWWW, patterned after HyperCard and built using the X Window System. It was eventually replaced in popularity by the Mosaic web browser. In 1993, the National Centre for Supercomputing Applications at the University of Illinois released version 1.0 of Mosaic, and by late 1994 there was growing public interest in the previously academic, technical Internet. By 1996 usage of the word Internet had become commonplace, and consequently, so had its use as a synecdoche in reference to the World Wide Web.

Meanwhile, over the course of the decade, the Internet successfully accommodated the majority of previously existing public computer networks (although some networks, such as FidoNet, have remained separate). During the 1990s, it was estimated that the Internet grew by 100% per year, with a brief period of explosive growth in 1996 and 1997.

This growth is often attributed to the lack of central administration, which allows organic growth of the network, as well as the non-proprietary open nature of the Internet protocols, which encourages vendor interoperability and prevents any one company from exerting too much control over the network. Using various statistics, AMD estimated the population of internet users to be 1.5 billion as of January 2009.

UNIVERSITY STUDENTS' APPRECIATION AND CONTRIBUTIONS

New findings in the field of communications during the 1960s, 1970s and 1980s were quickly adopted by universities across North America. Examples of early university Internet communities are Cleveland FreeNet, Blacksburg Electronic Village and NSTN in Nova Scotia. Students took up the opportunity of free communications and saw this new phenomenon as a tool of liberation. Personal computers and the Internet would free them from corporations and governments (Nelson, Jennings, Stallman).

Graduate students played a huge part in the creation of ARPANET. In the 1960s, the network working group, which did most of the design for ARPANET's protocols, was composed mainly of graduate students.

TODAY'S INTERNET

The My Opera Community server rack. From the top, user file storage (content of files.myopera.com), "bigma" (the master MySQL database server), and two IBM blade centers containing multi-purpose machines (Apache front ends, Apache back ends, slave MySQL database servers, load balancers, file servers, cache servers and sync masters)

Aside from the complex physical connections that make up its infrastructure, the Internet is facilitated by bi-or multi-lateral commercial contracts (*e.g.*, peering agreements), and by technical specifications or protocols that describe how to exchange data over the network. Indeed, the Internet is defined by its interconnections and routing policies.

By December 31, 2008, 1.574 billion people were using the Internet according to Internet World Statistics.

INTERNET PROTOCOLS

The complex communications infrastructure of the Internet consists of its hardware components and a system of software layers that control various aspects of the architecture. While the hardware can often be used to support other software systems, it is the design and the rigorous standardization process of the software architecture that characterizes the Internet.

The responsibility for the architectural design of the Internet software systems has been delegated to the Internet Engineering Task Force (IETF). The IETF conducts standard-setting work groups, open to any individual, about the various aspects of Internet architecture. Resulting discussions and final standards are published in Requests for Comments (RFCs), freely available on the IETF web site.

The principal methods of networking that enable the Internet are contained in a series of RFCs that constitute the Internet Standards. These standards describe a system known as the Internet Protocol Suite. This is a model architecture that divides methods into a layered system of protocols (RFC 1122, RFC 1123). The layers correspond to the environment or scope in which their services operate. At the top is the space (Application Layer) of the software application, *e.g.*, a web browser application, and just below it is the Transport Layer which connects applications on different hosts via the network (*e.g.*, client-server model). The underlying network consists of two layers: the Internet Layer which enables computers to connect to one-another via intermediate (transit) networks and thus is the layer that establishes internetworking and the Internet, and lastly, at the bottom, is a software layer that provides connectivity between hosts on the same local link (therefor called Link Layer), *e.g.*, a local area network (LAN) or a dial-up connection. This model is also known as the TCP/IP model of networking. While other models have been developed, such as the Open Systems Interconnection (OSI) model, they are not compatible in the details of description, nor implementation.

The most prominent component of the Internet model is the Internet Protocol (IP) which provides addressing systems for computers on the Internet and facilitates the internetworking of networks. IP Version 4 (IPv4) is the initial version used on the first generation of the today's Internet and is still in dominant use. It was designed to address up to ~4.3 billion (10) Internet hosts. However, the explosive growth of the Internet has led to IPv4 address exhaustion. A new protocol version, IPv6, was developed which provides vastly larger addressing capabilities and more efficient routing of data traffic. IPv6 is currently in commercial deployment phase around the world. IPv6 is not interoperable with IPv4. It essentially establishes a "parallel" version of the Internet not accessible with IPv4 software. This means software upgrades are necessary for every networking device that needs to communicate on the IPv6 Internet. Most modern computer operating systems are already converted to operate with both versions of the Internet Protocol. Network infrastructures, however, are still lagging in this development.

INTERNET STRUCTURE

There have been many analyses of the Internet and its structure. For example, it has been determined that both the Internet IP routing structure and hypertext links of the World Wide Web are examples of scale-free networks.

Similar to the way the commercial Internet providers connect via Internet exchange points, research networks tend to interconnect into large subnetworks such as the following:

- • GEANT
- • GLORIAD
- • The Internet2 Network (formally known as the Abilene Network)
- • JANET (the UK's national research and education network).

These in turn are built around relatively smaller networks. See also the list of academic computer network organizations.

Computer network diagrams often represent the Internet using a cloud symbol from which network communications pass in and out.

ICANN

The Internet Corporation for Assigned Names and Numbers (ICANN) is the authority that coordinates the assignment of unique identifiers on the Internet, including domain names, Internet Protocol (IP) addresses, and protocol port and parameter numbers.

A globally unified namespace (*i.e.*, a system of names in which there is at most one holder for each possible name) is essential for the Internet to function. ICANN is headquartered in Marina del Rey, California, but is overseen by an international board of directors drawn from across the Internet technical, business, academic, and non-commercial communities. The US government continues to have the primary role in approving changes to the root zone file that lies at the heart of the domain name system.

Because the Internet is a distributed network comprising many voluntarily interconnected networks, the Internet has no governing body. ICANN's role in coordinating the assignment of unique identifiers distinguishes it as perhaps the only central coordinating body on the global Internet, but the scope of its authority extends only to the Internet's systems of domain names, IP addresses, protocol ports and parameter numbers.

On November 16, 2005, the World Summit on the Information Society, held in Tunis, established the Internet Governance Forum (IGF) to discuss Internet-related issues.

LANGUAGE

The prevalent language for communication on the Internet is English. This may be a result of the Internet's origins, as well as English's role as a lingua franca. It may also be related to the poor capability of early computers, largely originating in the United States, to handle characters other than those in the English variant of the Latin alphabet.

After English (28.6% of Web visitors) the most requested languages on the World Wide Web are Chinese (20.3%), Spanish (8.2%), Japanese (5.9%), French and Portuguese (4.6%), German (4.1%), Arabic (2.6%), Russian (2.4%), and Korean (2.3%).

By region, 41% of the world's Internet users are based in Asia, 25% in Europe, 16% in North America, 11% in Latin America and the Caribbean, 3% in Africa, 3% in the Middle East and 1% in Australia.

The Internet's technologies have developed enough in recent years, especially in the use of Unicode, that good facilities are available for development and communication in most widely used languages. However, some glitches such as mojibake (incorrect display of foreign language characters, also known as kryakozyabry) still remain.

INTERNET AND THE WORKPLACE

The Internet is allowing greater flexibility in working hours and location, especially with the spread of unmetered high-speed connections and Web applications.

THE INTERNET VIEWED ON MOBILE DEVICES

The Internet can now be accessed virtually anywhere by numerous means. Mobile phones, datacards, handheld game consoles and cellular routers allow users to connect to the Internet from anywhere there is a cellular network supporting that device's technology.

Within the limitations imposed by the small screen and other limited facilities of such a pocket-sized device, all the services of the Internet, including email and web browsing, may be available in this way. Service providers may restrict the range of these services and charges for data access may be significant, compared to home usage.

COMMON USES

E-mail

The concept of sending electronic text messages between parties in a way analogous to mailing letters or memos predates the creation of the Internet. Even today it can be important to distinguish between Internet and internal e-mail systems. Internet e-mail may travel and be stored unencrypted on many other networks and machines out of both the sender's and the recipient's control.

During this time it is quite possible for the content to be read and even tampered with by third parties, if anyone considers it important enough. Purely internal or intranet mail systems, where the information never leaves the corporate or organization's network, are much more secure, although in any organization there will be IT and other personnel whose job may involve monitoring, and occasionally accessing, the e-mail of other employees not addressed to them. Today you can send pictures and attach files on e-mail. Most e-mail servers today also feature the ability to send e-mail to multiple e-mail addresses.

THE WORLD WIDE WEB

Many people use the terms Internet and World Wide Web (or just the Web) interchangeably, but, as discussed above, the two terms are not synonymous.

The World Wide Web is a huge set of interlinked documents, images and other resources, linked by hyperlinks and URLs. These hyperlinks and URLs

allow the web servers and other machines that store originals, and cached copies of, these resources to deliver them as required using HTTP (Hypertext Transfer Protocol). HTTP is only one of the communication protocols used on the Internet.

Web services also use HTTP to allow software systems to communicate in order to share and exchange business logic and data.

Software products that can access the resources of the Web are correctly termed user agents. *In normal use, web browsers, such as Internet Explorer, Firefox and Apple Safari, access web pages and allow users to navigate from one to another via hyperlinks. Web documents may contain almost any combination of computer data including graphics, sounds, text, video, multimedia and interactive content including games, office applications and scientific demonstrations.*

Through keyword-driven Internet research using search engines like Yahoo! and Google, millions of people worldwide have easy, instant access to a vast and diverse amount of online information. Compared to encyclopedias and traditional libraries, the World Wide Web has enabled a sudden and extreme decentralization of information and data.

Using the Web, it is also easier than ever before for individuals and organisations to publish ideas and information to an extremely large audience. Anyone can find ways to publish a web page, a blog or build a website for very little initial cost. Publishing and maintaining large, professional websites full of attractive, diverse and up-to-date information is still a difficult and expensive proposition, however.

Many individuals and some companies and groups use "web logs" or blogs, which are largely used as easily updatable online diaries. Some commercial organisations encourage staff to fill them with advice on their areas of specialization in the hope that visitors will be impressed by the expert knowledge and free information, and be attracted to the corporation as a result. One example of this practice is Microsoft, whose product developers publish their personal blogs in order to pique the public's interest in their work.

Collections of personal web pages published by large service providers remain popular, and have become increasingly sophisticated. Whereas operations such as Angelfire and GeoCities have existed since the early days of the Web, newer offerings from, for example, Facebook and MySpace currently have large followings. These operations often brand themselves as social network services rather than simply as web page hosts.

Advertising on popular web pages can be lucrative, and e-commerce or the sale of products and services directly via the Web continues to grow.

In the early days, web pages were usually created as sets of complete and isolated HTML text files stored on a web server. More recently, websites are more often created using content management or wiki software with, initially, very little content. Contributors to these systems, who may be paid staff, members of a club or other organisation or members of the public, fill underlying databases with content using editing pages designed for that purpose, while casual visitors

view and read this content in its final HTML form. There may or may not be editorial, approval and security systems built into the process of taking newly entered content and making it available to the target visitors.

REMOTE ACCESS

The Internet allows computer users to connect to other computers and information stores easily, wherever they may be across the world. They may do this with or without the use of security, authentication and encryption technologies, depending on the requirements.

This is encouraging new ways of working from home, collaboration and information sharing in many industries. An accountant sitting at home can audit the books of a company based in another country, on a server situated in a third country that is remotely maintained by IT specialists in a fourth. These accounts could have been created by home-working bookkeepers, in other remote locations, based on information e-mailed to them from offices all over the world. Some of these things were possible before the widespread use of the Internet, but the cost of private leased lines would have made many of them infeasible in practice.

An office worker away from his desk, perhaps on the other side of the world on a business trip or a holiday, can open a remote desktop session into his normal office PC using a secure Virtual Private Network (VPN) connection via the Internet. This gives the worker complete access to all of his or her normal files and data, including e-mail and other applications, while away from the office. This concept is also referred to by some network security people as the Virtual Private Nightmare, because it extends the secure perimeter of a corporate network into its employees' homes.

COLLABORATION

The low cost and nearly instantaneous sharing of ideas, knowledge, and skills has made collaborative work dramatically easier. Not only can a group cheaply communicate and share ideas, but the wide reach of the Internet allows such groups to easily form in the first place. An example of this is the free software movement, which has produced Linux, Mozilla Firefox, OpenOffice.org, *etc.*

Internet "chat", whether in the form of IRC chat rooms or channels, or via instant messaging systems, allow colleagues to stay in touch in a very convenient way when working at their computers during the day. Messages can be exchanged even more quickly and conveniently than via e-mail. Extensions to these systems may allow files to be exchanged, "whiteboard" drawings to be shared or voice and video contact between team members. Version control systems allow collaborating teams to work on shared sets of documents without either accidentally overwriting each other's work or having members wait until they get "sent" documents to be able to make their contributions.

Business and project teams can share calendars as well as documents and other information. Such collaboration occurs in a wide variety of areas including scientific research, software development, conference planning, political activism and creative writing.

FILE SHARING

A computer file can be e-mailed to customers, colleagues and friends as an attachment. It can be uploaded to a website or FTP server for easy download by others. It can be put into a "shared location" or onto a file server for instant use by colleagues. The load of bulk downloads to many users can be eased by the use of "mirror" servers or peer-to-peer networks.

In any of these cases, access to the file may be controlled by user authentication, the transit of the file over the Internet may be obscured by encryption, and money may change hands for access to the file. The price can be paid by the remote charging of funds from, for example, a credit card whose details are also passed—hopefully fully encrypted—across the Internet. The origin and authenticity of the file received may be checked by digital signatures or by MD5 or other message digests. These simple features of the Internet, over a worldwide basis, are changing the production, sale, and distribution of anything that can be reduced to a computer file for transmission. This includes all manner of print publications, software products, news, music, film, video, photography, graphics and the other arts. This in turn has caused seismic shifts in each of the existing industries that previously controlled the production and distribution of these products.

STREAMING MEDIA

Many existing radio and television broadcasters provide Internet "feeds" of their live audio and video streams (for example, the BBC). They may also allow time-shift viewing or listening such as Preview, Classic Clips and Listen Again features. These providers have been joined by a range of pure Internet "broadcasters" who never had on-air licenses. This means that an Internet-connected device, such as a computer or something more specific, can be used to access on-line media in much the same way as was previously possible only with a television or radio receiver. The range of material is much wider, from pornography to highly specialized, technical webcasts. Podcasting is a variation on this theme, where—usually audio—material is downloaded and played back on a computer or shifted to a portable media player to be listened to on the move. These techniques using simple equipment allow anybody, with little censorship or licensing control, to broadcast audio-visual material on a worldwide basis.

Webcams can be seen as an even lower-budget extension of this phenomenon. While some webcams can give full-frame-rate video, the picture is usually either small or updates slowly. Internet users can watch animals around an African waterhole, ships in the Panama Canal, traffic at a local roundabout or monitor their own premises, live and in real time. Video chat rooms and video conferencing are also popular with many uses being found for personal webcams, with and without two-way sound.

YouTube was founded on 15 February 2005 and is now the leading website for free streaming video with a vast number of users. It uses a flash-based web player to stream and show video files. Registered users may upload an unlimited

amount of video and build their own personal profile. YouTube claims that its users watch hundreds of millions, and upload hundreds of thousands, of videos daily.

INTERNET TELEPHONY (VOIP)

VoIP stands for Voice-over-Internet Protocol, referring to the protocol that underlies all Internet communication. The idea began in the early 1990s with walkie-talkie-like voice applications for personal computers. In recent years many VoIP systems have become as easy to use and as convenient as a normal telephone. The benefit is that, as the Internet carries the voice traffic, VoIP can be free or cost much less than a traditional telephone call, especially over long distances and especially for those with always-on Internet connections such as cable or ADSL.

VoIP is maturing into a competitive alternative to traditional telephone service. Interoperability between different providers has improved and the ability to call or receive a call from a traditional telephone is available. Simple, inexpensive VoIP network adapters are available that eliminate the need for a personal computer.

Voice quality can still vary from call to call but is often equal to and can even exceed that of traditional calls.

Remaining problems for VoIP include emergency telephone number dialling and reliability. Currently, a few VoIP providers provide an emergency service, but it is not universally available. Traditional phones are line-powered and operate during a power failure; VoIP does not do so without a backup power source for the phone equipment and the Internet access devices.

VoIP has also become increasingly popular for gaming applications, as a form of communication between players. Popular VoIP clients for gaming include Ventrilo and Teamspeak, and others. Play Station 3 and Xbox 360 also offer VoIP chat features.

2

Organisation and Structure of Curriculum Development

CURRICULUM ORGANISATION AND STRUCTURE

The curriculum is delivered through modules which are defined as 'elements' of learning. Each module has specified learning outcomes and associated assessment criteria. The course that you are studying will be made up of modules that together make up the named award for which you are enrolled.

Most courses will include:

- Mandatory modules (also known as core modules on some programmes) are modules that are required to be passed for the award)
- Elective modules (also known as designate modules on some programmes) are choices from a prescribed list(s) of modules.
- Option modules are options you can choose beyond elective or designate modules.

For some courses there is a formal prerequisite relationship between modules, requiring award of credit for the one module before enrolling on a linked follow up module.

Individual modules for undergraduate study are in multiples of ten credit points and are set at a specified level. Level 3 is equivalent to foundation undergraduate study (this was previously level 0), level 4 to basic/introductory undergraduate study (this was previously level 1), level 5 to intermediate undergraduate study (which was previously level 2) and level 6 to final/advanced undergraduate study

(which was previously level 3). Successful completion of a module and being awarded credit at the specified level is accumulated towards a specific award.

A full-time student will normally undertake modules to a value of 120 credits in one year 60 credits per semester. A part-time student may have more flexibility and may often be able to negotiate the amount of credit taken per year, but on average this would normally be 60-80 credits per year. A student taking more than 80 credits in any academic year would normally be classified as full-time.

On this basis a full-time student could achieve a degree award in three years (not counting any major sandwich placements) and a part-time student in five to six years.

Individual modules for post-graduate study are in multiples of 5 credit points, with a minimum of five credit points and, normally, a maximum value of 60 credits. Modules of 60 credits are normally only used for a dissertation/research project. Taught modules are normally not more than 30 credits. Each module successfully completed earns you credit at Masters level which is accumulated towards a specific award.

On a full-time basis a student would normally achieve a post-graduate diploma in two semesters, at 60 credits per semester, with a further three months normally required for the final Masters stage. A part-time student may negotiate the amount of credit taken per year, but on average this would normally be 60 credits per year. On this basis a full-time student could achieve a Masters award in one calendar year and a part-time student in three years.

Students may negotiate the completion of a programme of study by a mixture of full-time and part-time study to do this you would need to see your Programme Leader to agree a programme of study that is appropriate to your needs.

WHY INTEGRATE?

Educators are motivated to foster curriculum integration for both academic and ideological reasons. Such integration offers several potential academic benefits:

    (1) Curriculum integration fosters the ongoing reinforcement of skills and information learned in one area of study when utilized in another area.

    (2) Curriculum integration provides students a richer academic experience by broadening the context and applicability of information and skills that are learned.

    (3) Curriculum integration maximizes the utilization of learning time by "borrowing" from one area to support another. This is particularly important in Jewish day schools where educators face time pressures in all curricular areas.

On an ideological level, curriculum integration helps to create holistic students who are able to see the relevance of their Judaism in all areas of their lives. This prevents compartmentalization in which students separate between the religious and secular aspects of their lives. Such separation can lead to competition between the two worlds, with the Jewish component often losing out.

WHAT IS INTEGRATION?

We might find valuable insights into the issue of curriculum integration in the literature in general education. A common misconception among Jewish educators is that curriculum integration by definition involves interdisciplinary study. Fogarty (1991) identifies ten models of integration that fall into three general categories: 1) integration within single disciplines, 2) integration across several disciplines, and 3) integration within and across learners. She defines the goal of integration as follows: "to help young minds discover roots running underground whereby contrary and remote things cohere and flower out from one stem."

As such, integration represents a way of thinking rather than simply an overlapping of curriculum. Perkins and Salomon (1984) utilize the term "transfer" to describe this way of thinking. They distinguish between "learning" and "transfer". "Learning" is characterized by the ability of the student to demonstrate performance in a context that is more or less the same as the learning situation. "Transfer" takes place when the student is able to apply knowledge acquired to different situations.

A classical example of learning without transfer is often seen in Hebrew language instruction. Parents often wonder how their children could have received good grades in Hebrew language for 12 years and still be unable to function in a Hebrew-speaking society. In all likelihood, the children's instruction and assessment remained within the context of the classroom. As a result, they are unable to transfer their knowledge of Hebrew to other contexts.

The following three exercises represent different levels of learning and transfer for children who are learning multiplication tables in the study of mathematics:

(1) 6 x 8 =
(2) If an apple costs 8 cents, how much would it cost to buy 6 apples?
(3) How far would a car travelling 60 miles per hour travel in 8 hours?

The child who can only answer the first question has learned the material, but has not demonstrated transfer. The student who is able to answer the second question demonstrates a certain level of transfer. Mastery of the third question reflects an even greater degree of transfer.

As this example illustrates, the levels of transfer achieved in given learning situations can vary. Perkins and Saloman (1984) have identified two typologies of transfer, "low road transfer" and "high road transfer". Low road transfer involves spontaneous, automatic transfer of highly practiced skills with little need for reflective thinking. High road transfer involves an explicit formulation of abstraction in one situation that enables making a connection to another context. These authors make a further distinction in high road transfer between "forward reaching transfer" and "backward reaching transfer". In forward reaching transfer, abstractions are formulated in the initial learning that allows for future application. In backward reaching transfer, students formulate an abstraction guiding their reaching back to past experience for relevant connections.

With this model in mind, we can better understand Fogarty's assertion that integration can take place within one discipline. For example, Talmud study by itself provides an excellent opportunity for promoting high road transfer. The Gemara often gives the student a dispute in a legal case and then tries to abstract the principle behind the dispute. Theories are tested by application to other cases. Similarly, in geography, the student may be encouraged to apply concepts from the study of the development of a city in ancient times to the study of a more modern city. Conversely, our understanding of the concept of transfer can also help to explain the failure of many attempts at interdisciplinary integration. Simply reading The Giving Tree or studying a science unit on trees in conjunction with Tu Bishvat does not ensure that high road transfer takes place. As Brophy and Alleman (1991) assert, "An activity is appropriate because it promotes progress towards significant educational goals, not merely because it cuts across subject-matter lines."

CAN INTEGRATION BE TAUGHT?

According to Perkins and Salomon (1984), teachers can foster or hinder transfer in their instruction. A focus on content oriented questions and analysis tends to thwart the process of transfer. Transfer, however, can be encouraged through processes that the authors (1988) refer to as "hugging" and "bridging". Hugging is a method of fostering low road transfer. In hugging, teachers present material in a manner that creates resemblance conditions leading to a similarity of context. Thus, if teachers wants students to transfer concepts learned in biology to ecology, they will frame the ecology lesson in a way that accents the contextual similarity.

Bridging is a technique that encourages high road transfer. In bridging, the teacher mediates the desired processes of abstraction and connection making. For example, a social studies teacher might ask students what factors provoked World War I and where such factors are now operating in the world. Perkins and Salomon (1988) contend that these methods can do much to foster transfer in the instructional setting when used persistently and systematically.

IS INTERDISCIPLINARY INTEGRATION DESIRABLE?

There are those who question whether it is, in fact, advisable to engage in interdisciplinary integration in our schools. From a Jewish perspective, we find a hesitancy, even among those who advocate the concept of Torah Umada, the integration of Torah and general studies. In his address to alumni of Yeshiva University on the school's fiftieth anniversary, Dr. Norman Lamm, president of the university, quoted his predecessor, Dr. Samuel Belkin: "Our job is to give the students the material; their job is to let the materials interact within their minds." Apparently, the bastion of the Torah Umada philosophy advocates a student-based integration facilitated by the presentation of parallel tracks without mediation. Interestingly, Howard Gardner has also expressed reservations about interdisciplinary instruction (Gardner, 1999).

To use the word interdisciplinary, one must show that particular disciplines have been mastered and appropriately joined. Such interdisciplinary synthesis is simply not feasible for most youngsters during the middle years of childhood, or for most of their teachers. Rather, I see most so-called interdisciplinary curricula as commonsense or proto-disciplinary activities. Instead of drawing on or preparing disciplined thinking, these approaches tend to ignore the pre-or proto-disciplinary distinctions that young children are becoming able to master.

While Gardner does not negate that "interdisciplinary" curricula may have some other value, he does assert that, at least prior to high school, they do not promote interdisciplinary thinking, and may in fact ultimately hamper such thinking by weakening mastery of specific disciplines. Gardner states a further reservation regarding the inability of many teachers to actually facilitate interdisciplinary study. These comments might be construed to support the compartmentalized approach reflected at Yeshiva University and many day schools. They could also be used to support the use of student based integration models that fall into Fogarty's third category, "integration within and across learners".

Yet, Bieler suggests that integrating Jewish and general studies may have another important goal. He quotes Heilman's assertion that compartmentalization often entails not only separation, but also devaluation of at least one of the elements being kept apart from the other (Heilman, 1978). If so, then departmentalization in the day school will often lead to the devaluation of either the Jewish studies component or the general studies component, undermining the goal of creating students with integrated world views who can live holistically as Jews in the modern world. On the contrary, Bieler claims that such departmentalization creates a dissonance for learners that may lead to an active or passive disregard of one of the two worlds in which the school wants them to live. Thus, schools that wish to foster integrated world views must seek ways of overcoming compartmentalization within the given limitations.

CURRICULUM DESIGN AND NEEDS ANALYSIS

It stands to reason that schools wishing to effect integration must be sensitive to the educational issues discussed above, as well as the obstacles to successful implementation. The following are potential impediments to interdisciplinary integration that must be considered.

(1) *Teachers:* As indicated by Gardner, not all teachers are capable of true interdisciplinary integration. If that is so in general studies, then it poses an even greater challenge in the integration of Jewish and general studies. Many instructors in the Jewish studies department do not possess expertise, or even a high level of familiarity, in areas of general studies. Conversely, general studies teachers, some of whom are not Jewish, are often not versed in the Jewish studies content and methodology.

(2) *Coordination:* The lack of teachers within the day schools who have interdisciplinary scope would require a team reaching approach for

interdisciplinary instruction. The success of such an effort would depend upon the motivation and commitment of participating teachers, as well as the availability of adequate planning time to allow for the development of meaningful integrated instruction.

(3) *Complexity:* As Bieler (1986) has pointed out, the complex integration constructs that have been developed by philosophers such as Harav Yosef Dov Soloveitchik and Harav Aharon Lichtenstein are difficult to translate into the curricula of Diaspora day schools because of both the complexity of the material and the inability of most students to function within such a system.

INTEGRATION AND STRUCTURE OF DISCIPLINES

Heidi Hayes Jacobs (1991) indicates that the largest obstacle to curriculum integration is that people try to do too much. Successful implementation must take into account the various levels and phases of integration that might be possible in a school. It is important to keep in mind that curriculum integration is not a goal unto itself, but a means towards the creation of integrated thinkers.

The following are some recommendations that flow from the above analysis:

(1) Integration does not have to be interdisciplinary. The first step towards integration is to foster integrated thinking with each discipline. Teachers of both Jewish and general studies must foster low road and high road transfer rather than simple learning within their instruction. Such fostering represents a pedagogical skill that can be developed through proper in-service training.

(2) Teachers who are capable of drawing on information from other disciplines should be encouraged to do so when appropriate, but not at the expense of the mastery of their own discipline. For example, a teacher of Torah who is covering Shemot 1:10-22 might wish to have students analyze events in Nazi Germany in light of the different approaches of the commentators on this section and the different analyses of the Nazi programme by historians. The goal of teaching Torah, however, must not necessarily be to seek their relevance to modern events, but rather to master textual analyses and study of the commentators. Connections should be made only when they represent a high road transfer.

(3) Interdisciplinary integration can be fostered, as well, without interdisciplinary instruction. Such integration involves the process defined by Fogarty as integration within and across learners. An example of this process would be a project that calls on the student to draw on a variety of disciplines in order to complete the work. This approach is appropriate to Gardner's model in which mastery of disciplines is conducted in parallel and the student makes the connection between them. The difference between this model and the Yeshiva University model is that the process of integration is mediated by the teachers, although not through instruction per se.

(4) Meaningful interdisciplinary instruction can take place when motivated teachers are given enough planning time to successfully create integrated units. A school can present its students with models of integrated thinking through periodic presentation of integrated units. Such a model does not have to encompass all subjects or be used by all of the staff.

Jacobs (1991) proposes a phased action plan for implementing curriculum integration in a school.

An important element of her plan involves the creation of a dynamic within the staff through cooperative "action research" activities. By defining goals well and providing appropriate in-service and cooperative planning activities for faculty members, our schools can indeed succeed in the elusive goal of curriculum integration.

CLASSIFICATION OF CURRICULUM CONCEPTS

The Classification of Concepts in Consumer Education was authored by Rosella Bannister and Charles Monsma in 1980 at Eastern Michigan University. Research was conducted at the National Institute for Consumer Education (Michigan Consumer Education Centre) with funding provided by the United States Department of Education.

The classification has become an accepted framework, used by classroom teachers, programme planners and curriculum designers in the United States and other nations. A copy of the complete taxonomy is available from NICE, 207 Rackham Building, Eastern Michigan University, Ypsilanti, MI 48197.

DECISION MAKING

Definition: The act or process of choosing.

APPLICATION TO CONSUMER EDUCATION

The broad category of decision making, including both the act of choosing and the conditions of choice, serves as a foundation for the entire field of consumer education.

Consumer educators have long recognized that the decisions which consumers make are influenced by a wide range of factors. Two levels of influence can be identified: those which are personal to individuals and those which are a part of the broader external environment within which consumers live. While the personal factors, such as values, are often major elements in consumer education courses and textbooks, the external factors such as economic, political, and societal influences, are seldom covered thoroughly.

The influence which flows between the factors affecting consumer decisions and the actual decisions which consumers make is reciprocal; those decisions also have an impact upon the context in which future decisions will be made.

EXTERNAL FACTORS AFFECTING CONSUMER DECISIONS

Definition: Those elements in the outside environment of consumers which influence their choices; includes the economic, political, and social systems as well as ecological and technological influences.

APPLICATION TO CONSUMER EDUCATION

Consumer educators should consider the economic, political, social, and physical environments of the marketplace, as well as technological influences on it. Whereas most consumer education programmes and materials focus on the individual level of values, decision-making and wise use of resources, the changing economic setting and a commitment to democratic processes demand an enlargement of the scope of consumer education. Consumer educators should examine public and private sector political and economic decisions which directly affect the marketplace and should educate the public about their ramifications. Students should learn how to evaluate the social and economic impact of their decisions. New technological realities must be recognized and anticipated.

The context of analysis for these problems must be global, recognizing the increasing interdependence of all nations and their peoples. Future possibilities as well as present realities must be considered when making individual and collective consumer decisions.

Many broad social and economic changes have been underemphasized in consumer education programmes and materials. If consumers are to deal realistically with the context of their decisions, these changes must be addressed.

ECONOMIC SYSTEM

Definition: The organization or structure of the production, distribution, and consumption of goods and services in a society.

APPLICATION TO CONSUMER EDUCATION

Consumer education focuses on the consumer decisions which result from interactions between consumers and producers in the economic system. This is why the discipline of economics has often been accepted as the dominant analytical contributor to consumer education. While not wishing to de-emphasize the importance of other external systems and influences on consumer decisions, some knowledge of the economic system within which consumer transactions take place is necessary to understanding both the causes and implications of consumer decisions. Many basic economic concepts are vital to effective consumer education.

Particularly as the economy changes, the effects of these changes must be anticipated and understood by consumer educators. If consumers are to cope with these changes, and especially if they hope to influence the operation of the economic system of which they are an integral part, a strong base of economic understanding is a necessity.

While the relationship between economics and consumer education is strong, it would be inaccurate to imply that either field subsumes the other. Parts of each field can best be seen as subsets of the other, each field having a different scope and focus, but with many areas of overlap between them. Listed below are those economic concepts which seem most directly related to consumer decisions, although a much longer elaboration would be possible if all areas of overlap were included.

UNEMPLOYMENT

Inflation: Additional economic concepts which are closely related to important consumer education concerns include: Economic Concentration, Monetary Policy, Fiscal Policy, Productivity, Economic Growth, International Trade, Interdependence, Income Distribution.

POLITICAL SYSTEM

Definition: The organization or structure of government and those forces which influence public policy in a society.

APPLICATION OF CONSUMER EDUCATION

Most consumer education materials now recognize that much legislation has been passed which relates to the transactions made by consumers in areas such as credit and product safety. Less often recognized is the impact of public policy and political power relationships on the overall environment within which consumers operate. Government monetary and fiscal policies affect the overall state of the economy. The rigour of anti-monopoly policies or enforcement of competitive rules affects the price and availability of goods and services, and government itself has become a major supplier of the services which consumers receive.

While there has been a long term trend of tremendous growth of the public sector, the recent movement towards challenging taxation and regulation levels of government has attempted to swing the pendulum back in the other direction. Consumer educators must be conscious of the implications for consumers both of government action and the challenges to it. The costs and benefits to consumers of increasing or decreasing the governmental role must be carefully measured.

This is an important research perspective of consumer education, which has too often been neglected in favour of marketing studies related to buyer behaviour and the effects of marketing strategies. Consumer perspectives must take their place along with aggregate economic effects and impact on business, as inputs to the public policy process.

SOCIAL SYSTEM

Definition: The structure of relationships among human beings in a society.

APPLICATION TO CONSUMER EDUCATION

Our consumer choices are affected by the roles we play, the status we hold or desire, and the cultural values or standard of living we seek to maintain. These

elements of our social milieu are often reinforced and sometimes challenged through advertising, which attempts to turn socially attractive appeals into specific buying decisions. The values and goals of the society around us work, even when we are not conscious of their action, to influence consumer behaviour. Not only does the operation of the social system affect individual behaviour; it also provides a mechanism through which resources can be shared among individuals, groups, and nations.

Many of the changes presently occurring in the social structure have a direct impact on individual and collective consumer decisions. Changing sex roles, changes in the work force, variations in lifestyle, and the variety of demands emanating from a pluralistic culture — all these things affect the nature and quantity of goods and services which are used by consumers. Social pressures for or against change may create tensions which find their outlet in the way resources are earned or spent. While seldom given direct focus in consumer education materials, the impact of the social system rivals that of economic and political concerns in overall influence on consumer decisions.

ECOLOGICAL INFLUENCE

Definition: The affect of factors in the physical or ecological environment on decisions made by consumers.

APPLICATION TO CONSUMER EDUCATION

Throughout the decades of unrestrained economic and seemingly inexhaustible resources, consumer educators paid little attention to the interrelationship between the physical environment and individual consumer decisions. The question of possible restraints was one which related to personal values and resources rather than to aggregate availability of resources or societal needs Although various scenarios of the future are being put forward, ranging from total pessimism to complete optimism, all points of view now recognize the necessity to take into account ecological realities. Conservation, pollution, alternative sources of energy, new modes of transportation — these and other considerations related to the physical environment have become a part of consumer education as they affect a wide range of consumer decisions.

TECHNOLOGICAL INFLUENCE

Definition: The practical application of scientific or mechanical advances in ways which affect consumer decisions.

APPLICATION TO CONSUMER EDUCATION

Numerous sources in the literature of many fields point to the increasing impact of technology on the lives of all people. Technological advances are an everyday part of consumer transactions at many levels. New consumer products such as transistorized calculators and in-home computers become available on a regular basis. New developments in the use of nuclear power or new medical

techniques make additional services available to consumers and confront them with decisions about individual or collective use of these resources. New techniques for the carrying out of consumer transactions, such as electronic funds transfer and universal product code, must be mastered and evaluated by consumers in order to function effectively and exercise appropriate control measures in marketplace transactions. Consumers need to develop individual and collective competence in technical matters so that technology can retain its proper role as servant rather than master in the human decision-making process.

PERSONAL FACTORS AFFECTING CONSUMER DECISIONS

Definition: Those elements related to the individual characteristics or backgrounds of consumers which influence their choices.

APPLICATION TO CONSUMER EDUCATION

Consumer education courses and curriculum materials have often used the personal characteristics of individual consumers as a starting point, particularly questions of individual values and goals. The field must continue to emphasize this area, recognizing that the integration of societal factors with personal influences on behaviour is a vital area of concern. Social changes in family and sex roles affect individual lifecycle patterns. Lifestyle possibilities may be affected by resource constraints on the entire society.

Individual values and needs should be assessed in terms of societal values and needs, and the goal setting process should be based on more than individual considerations. Gaps between individual goals and societal needs or conflicts between values may cause tensions which should be addressed by consumer education. Most consumer decisions will still be the result of individual factors affected by direct and personal concerns. It is the task of consumer education to aid consumers in understanding, integrating, and molding the full range of factors which affect their decisions.

RESOURCES

Definition: The human and material assets which are used by consumers in implementing their decisions.

APPLICATION TO CONSUMER EDUCATION

Consumers must be familiar with the wide range of resources available for their use. The personal wealth gained through employment or from other sources is most universally considered, but many kinds of resources, both individual and communal, can be substituted for financial resources. An individual has time, energy, and ability to contribute in obtaining goods or services, as parents do in cooperative day care centers. Public forms of entertainment, such as parks, can be substituted for private forms which may be more expensive. Wise use of available resources has always been and will continue to be a primary function of consumer education.

LIFECYCLE

Definition: A series of stages through which an individual or group passes during its lifetime.

APPLICATION TO CONSUMER EDUCATION

The concept of lifecycle is an extremely useful one for consumer educators as it can provide a framework for discussing the changes in the lives of consumers which affect the kinds of decisions which must be made. Differences in age, source and level of income, and the composition of the household of which the consumer is a part will affect both the nature and the outcome of consumer choices. Consumers must understand and prepare for lifecycle changes, sometimes planned but often unexpected, which will occur to everyone. Consumer educators must be careful to keep lifecycle descriptions flexible and not assume that all consumers will follow one lifecycle pattern. Changes in the social structure make it apparent that many patterns of employment and household arrangements are widespread throughout the society.

VALUES AND GOALS

Definition: Values are the ideas and principles which an individual, group, or society consider correct, desirable, or important. Goals are those specific aims or objectives which reflect a set of values.

FUTURE IN EDUCATION: SCHOOL DESIGN

Exponential Growth of Information

500 years ago people knew little about the world around them. Chances were good that they were born and died in the same house, traveled little, and had little awareness of the rest of the world. Knowledge was shared on an "as needed" basis by the more educated members of society, often the church or the ruling family. Today, we are overwhelmed with so much information coming at us with such speed and volume that we are suffering from overload. Specialty areas have been created in education, medicine and business to help us cope with the overload. Frey sees the continued control of information by a few. There is still the notion that only doctors know about medicine and only teachers know how to prepare for the future.

Overwhelming Statistics

Frey points out that information in the past was in text form in books.

We read it, we memorized it, we listened to a lecture on it, we took a test on it and moved on to another topic or another book. Today, our society no longer learns auditorily. We are now visual and spatial learners.

Information comes in a variety of dimensions.
- Over 3.5 million song on iTunes
- Over 4 million books on Amazon

- Over 60 million blogs online
- Over 4 million entries on Wikipedia
- Over 100 million user accounts on MySpace
- Over 6.1 million videos on YouTube

Information is now not only coming at us in massive volume but is text-based, graphical, musical, audio and visual.

Confidence based Learning

In order to handle the large volume of knowledge, what methods are rising to the top? Kate Hevner's first study on Confidence-Based Assessment appeared in the Journal of Social Psychology in 1932. This is not a new discovery. It was initially used to improve the validity and reliability of standard musical assessments. But, in 1967, it was discovered that Confidence-Based Assessment also improved memory retention.

The Corporate World

This method did not become popular in schools but in corporate training centers. It is on the rise in many organizations.

Thomas Frey says, "Confidence-based learning is designed to ensure that learning actually takes place and mastery of a topic is achieved. It is much more than simply delivering information to students.

It ensures learning by assessing precisely what people know and what they don't know without guesswork and doubt skewing the results. It then works to rapidly remediate a learner's gaps in knowledge and confidence."

How it Works?

Before we can begin learning something new, we first need to assess how much knowledge-base there is and how much information is present. Tests are usually scored by how many questions are correct.

C-BL assesses:
- Correct answers that are answered with confidence, indicating competency
- Correct answers that are answered with doubt
- Correct answers that are total guesses, equivalent to no knowledge
- Incorrect answers that are answered with confidence, indicating misinformation

According to confidence-based learning, the best time to learn is immediately after a test when doubt and misinformation have been exposed.

If confidence-based learning is incorporated into courseware-builder, the speed of learning can be increased dramatically—by as much as 50% or even more.

Archived Knowledge Vs. Craftsman

Some knowledge can be stored in books, archives, and museums. Other knowledge must be experienced. Learning about the pyramids, famous artists,

and history can be archived. Learning how to lay a foundation for a house, repair a car, or refinish a piece of furniture can not. Some knowledge has to be experienced through hands-on knowledge—seeing, feeling.

The key to all learning will be easy-to-use courseware.

The First Two Steps

Frey sees the first two steps in dramatic change as Courseware Builder and the 60 Minute Learning Experience. he Courseware Builder will be a fill-in-the-blanks templated process that will carefully step the producers through the design, build, and launch phases of each course. he 60 Minute Learning Experience will be an international unit of measurement recognized around the globe. Education will measure learning modules around the "hour." They may be 2-hour formats or 5-hour formats, the 60 minute hour will be the basis. In the next installment, Thomas Frey explains how the courseware units will be funded and how schools will make the transition to this new world of education.

Touch Points

When we come in contact with the world, we "touch" the world. Touch points are where we make contact. Thomas Frey, founder of the DaVinci Institute, states that physical touch points are:
- The shoes we walk in
- The bed we sleep in
- The chairs we sit in

We "touch" the world through the above.

How do we touch the world in which we live in education?

The Classroom

The accepted touch point in education is a school. We feel we are learning if we are in a school. While most educators will state that learning takes place in a classroom, other activities also promote learning:
- Homework
- Reading assignments
- Writing papers
- Classroom Problems

While it is an accepted fact that learning takes place in a classroom in a school, there are some problems with this.

The teacher controlling the classroom also is in charge of:
the time when learning takes place
the students who will participate
the lighting
the sounds
the media used
the tools
the pace

the subject matter
the results
Frey believes that the classroom is not necessary for learning. Learning takes place when we wake up in the morning. We even continue to learn while sleeping. Learning is happening every minute of the day.
Learning tools include:
- Computers
- Electronic newspapers
- Video magazines
- Handheld televisions
- Cell phones
- MP3 players
- Video games
- Artwork

Even if we are watching a movie, we learn:
- The plot
- About the characters
- The setting
- The drama
- The resolution of the problem
- The popcorn in the theater
- The theater seats

Maslow

In 1943, Abraham Maslow wrote a paper titled, A Theory of Human Motivation. Maslow observed human behaviour. His theory states that we as humans have basic needs. These needs must be fulfilled to progress in society. The needs are from the basic to the higher needs. Maslow's Hierarchy appears in the form of a triangle with the basic needs being the foundation and the higher needs forming the top tier. If the needs of the foundation are not met, the higher levels may not develop. For example, a child that is concerned about food and safety (levels 1 & 2) will not be learning (level 5) or realize potential (level 7). Level 1 must be in place before level 3 can be achieved—just like a house needs a foundation in place before the building begins.

The first four foundation steps are:
1. *Physiological:* hunger, thirst, bodily comforts
2. *Safety-security:* out of danger
3. *Belongingness and Love:* affiliate with others, be accepted
4. *Esteem:* to achieve, be competent, gain approval and recognition
   Maslow continues with higher levels. These are now possible because levels 1-4 are met.
5. *Cognitive:* to know, to understand, and explore,
6. *Aesthetic:* patterns, symmetry, order, and beauty,
7. *Self-actualization:* to find self-fullfillment and realize one's potential,

8. *Self-transcendence:* to connect to something beyond the ego or to help others find self-fulfillment and realize their potential.

Maslow's ultimate conclusion is that the highest levels of self-actualization are transcendent in their nature and may be one of his most important contributions in this area of society. Frey's next installment will explain his vision of the transition from generalized education to individualization.

3

Syllabus and Curriculum

When it comes to education, the two concepts which pop up in our mind which are commonly misconstrued are syllabus and curriculum. Syllabus connotes the subjects as well as the topics covered in the course of study. On the other hand, curriculum implies the chapters and academic content taught in school or college. It alludes to the knowledge, skills and competencies students should learn during study.

The fundamental difference between syllabus and curriculum is that the former is focused towards a particular subject. Unlike, the latter, which is related to the all-round development of a student. Similarly, there are other differences between these two, that are discussed in the article provided below, take a read.

Definition of Syllabus

The syllabus is defined as the documents that consist of topics or portion covered in a particular subject. It is determined by the examination board and created by the professors. The professors are responsible for the quality of the course. It is made available to the students by the teachers, either in hard copy or electronic form to bring their attention towards the subject and take their study seriously.

A syllabus is considered as a guide to the in charge as well as to the students. It helps the students to know about the subject in detail, why it is a part of their course of study, what are the expectations from students, consequences of failure, *etc.* It contains general rules, policies, instructions, topics covered, assignments, projects, test dates, and so on.

Definition of Curriculum

The curriculum is defined as the guideline of the chapters and academic content covered by an educational system while undergoing a particular course or programme.

In a theoretical sense, curriculum refers to what is offered by the school or college. However, practically it has a wider scope which covers the knowledge, attitude, behaviour, manner, performance and skills that are imparted or inculcated in a student.

It contains the teaching methods, lessons, assignments, physical and mental exercises, activities, projects, study material, tutorials, presentations, assessments, test series, learning objectives, and so on.

The curriculum is well planned, guided and designed by the government or the educational institution. It is aimed at both physical and mental development of a student. It is the overall learning experience that a student goes through during the particular course of study.

Key Differences between Syllabus and Curriculum

The basic differences between syllabus and curriculum are explained in the point given below:
1. The syllabus is described as the summary of the topics covered or units to be taught in the particular subject. Curriculum refers to the overall content, taught in an educational system or a course.
2. Syllabus varies from teacher to teacher while the curriculum is same for all teachers.
3. The term syllabus is a Greek origin, whereas the term curriculum is a Latin origin.
4. The curriculum has a wider scope than the syllabus.
5. The syllabus is provided to the students by the teachers so that they can take an interest in the subject. On the other hand, normally the curriculum is not made available to the students unless specifically asked for.
6. Syllabus is descriptive in nature, but the curriculum is prescriptive.
7. Syllabus is set for a particular subject. Unlike curriculum, which covers a particular course of study or a programme.
8. Syllabus is prepared by teachers. Conversely, a curriculum is decided by the government or the school or college administration.
9. The duration of a syllabus is for a year only, but curriculum lasts till the completion of the course.

Curriculum and Syllabus are the terms of education, imparted to the students by teachers. It means the knowledge, skills or qualifications that are passed on from one generation to another. A subject syllabus is a unit of the curriculum. The two terms differ in a sense that curriculum is a combination of some factors which helps in the planning of an educational programme, whereas a syllabus covers the portion of what topics should be taught in a particular subject.

DIFFERENCE BETWEEN
SYLLABUS AND CURRICULUM

Essentially, a syllabus is a descriptive outline and summary of topics that are to be covered in an education or training course. The syllabus will usually provide specific information about the said training course and is often drafted by the governing body or by the instructor of the course. A curriculum is the set of courses, and their content, offered at a school or university. A general curriculum, in the broadest sense of the word, may list all courses offered at a specific school. A curriculum is prescriptive, which means that is issued by the governing body and lists topics the must be understood by the student at the end of the course, and what level to achieve a particular grade or standard. Essentially, a syllabus is a descriptive outline and summary of topics that are to be covered in an education or training course. The syllabus will usually provide specific information about the said training course and is often drafted by the governing body or by the instructor of the course. Syllabi, on the other hand, are the plural form of a syllabus.

According to Dictionary.com, a syllabus is:

- An outline or other brief statement of the main points of a discourse, the subjects of a course of lectures, the contents of a curriculum, *etc.*
- A short summary of the legal basis of a court's decision appearing at the beginning of a reported case.
- A book containing summaries of the leading cases in a legal field, used especially by students.

A typical syllabus will contain information on how, where and when to contact the lecturer and teaching assistants; an outline of what will be covered in the course; a schedule of test dates and the due dates for assignments; the grading policy for the course; specific classroom rules; *etc.*

The purpose of a syllabus is to ensure consistency between courses thought at different colleges under the same governing body. A syllabus issued by the governing body, *i.e.*, the board of education, the head of department, etc, may be modified by the instructor as long as it is consistent with the curriculum.

The syllabus also serves as a means for the students to be aware and understanding what they will be thought in the duration of the course.

Wikipedia lists the various purposes served by a syllabus:

- Fair and impartial understanding between the instructor and students such that there is minimal confusion on policies relating to the course
- Setting clear expectations of material to be learned
- Setting clear expectations of behaviour in the classroom
- Setting clear expectations of effort on student's behalf to be put into the course
- Providing a roadmap of course organization/direction relaying the instructor's teaching philosophy to the students
- Providing a marketing angle of the course such that students may choose early in the course whether the subject material is attractive
- Clarifying student understanding of specified material such as grading policy, grading rubric, late work policy, locations and times

- Providing contact information for instructor and teaching assistant such as phone or email
- Listing materials required and/or recommended such as textbooks, assigned reading books, calculators, lab vouchers, or other equipments
- Listing outside resources for subject material assistance, including extracurricular books, tutor locations, resource centers, *etc.*
- Important dates in course such as exams and paper due-dates
- Tips for succeeding in mastering course content such as study habits and expected time allotment
- Suggested problems if applicable
- Necessary pre-requisites or co-requisites to current course
- Safety rules if appropriate
- Objectives of the course

Types of syllabus include:
- Notional-Functional syllabus
- Grammatical syllabus
- Lexical syllabus
- Situational syllabus
- Text-based syllabus
- Skill-based syllabus
- Task-based syllabus
- Learner-generated syllabus
- Mixed syllabus
- Online course syllabus

A curriculum is the set of courses, and their content, offered at a school or university. The term, 'curriculum' is derived from the Latin word "Currere" which means to run/to proceed. Currere refers to the 'course of deeds and experiences through which children grow to become mature adults.'

The various purposes served by a curriculum:
- May refer to all courses offered at a school
- May refer to a defined and prescribed course of studies
- Lists course of studies which students must fulfill in order to pass a certain level of education
- May discuss how the sum of lessons and teachings will help students learn the basics

The main difference between a syllabus and a curriculum is that a curriculum is a more generalized or an overview of the subjects or topics that the students are meant to learn. However, a syllabus is a more detailed overview of the subject of study. For example: a math curriculum may list basics of algebra, basics of geometry and basics of trigonometry. While, the class syllabus will list what topics will be covered under each of the basic topics, what will be the concepts that students may understand by the end of each topic, and it may even list what exercises or problems in the textbook will be covered during class. Hence, it can be said that syllabus is a subset of curriculum.

CURRICULUM AND CURRICULUM TRANSACTION

Curriculum is normally understood as a common, officially prescribed syllabus with an accompanying package of textbooks. For instance, Jangira (1984) defines curriculum as an operational document that translates educational objectives into practice propositions and that this document arises out of a continuous process of curriculum development and curriculum transaction, with the latter contributing to the former.

Within this framework, (the mandated) curriculum is perceived as a component in the multi-stage process of designing tools for teaching; that it is a fixed entity un-problematically delivered to the students. School education has been periodically passed through different curricular and other reforms.

National Council of Educational Research and Training (NCERT) is an apex body which has always played an important role in this reforms and activities.

It came out with National Curriculum Framework (NCF)-2005 with wide discussion and debates. NCF-2005 is a reflective document of what should be our education system in the future. It has reflected upon the different curricular areas as well as on the strategies to achieve them too. It has stressed upon the pedagogical aspects of different curricular content areas and transaction strategies. Accordingly, new textbooks have been written. The government of India has henceforth taken enormous efforts to train the teacher about the new transaction methods for the new textbooks. It has organized different in-service programmes as well as orientation programmes to acquaint the teachers to the new methodology of teaching and learning in science. Without the effective knowledge of science the students are sure of not doing better in their future life. Modern approach of science education demands more of active participation than the traditional system. The modern learners are now not mere passive listener in the class but are eager to participate in each and every step of learning.

The guiding principle of NCF highlighted the following points.

- Connecting knowledge to life outside the school
- Ensuring that learning is shifted away from rote method
- Enriching the curriculum to provide for overall development of children rather than remain textbook centric
- Making examinations more flexible and integrated into classroom life and
- Nurturing and overriding identity informed by caring concerns within the democratic polity of the country facility available was developed.
- It gave information about library, laboratory, ICT facilities, demonstration kits, maths clubs, Science Park, school garden, *etc.* available in school.

NEEDS FOR CURRICULUM DEVELOPMENT

After reviewing the procedures in this step, curriculum team members will understand how to conduct a needs assessment and use the results to formulate intended outcomes.

Curriculum development was described as the process of determining **who** will be taught **what** and **how.** The **needs assessment and analysis** step in curriculum development systematically focuses on learning about an issue or problem and the people who are directly effected by it. A needs assessment provides the information to determine outcomes (educational objectives) based on a factual foundation and learners needs. A needs assessment also provides baseline data to evaluate the achievement of intended outcomes. The goal is to have those who are most directly affected by issues and problems define them, isolate the contributing factors, and suggest solutions.

Wentling, (FAO, 1993) defines a problem (issue) as the gap between **desired behaviour** (what should be known and/or done) and actual performance (behaviour).

A NEED OR GAP IS:

Desired Performance-Actual=NEED

(What Should Be)-(What Is)=GAP

The needs assessment process identifies the nature and scope of the gap. An underlying principle is to "start with what people already know and build on what they already have." The first task then is to establish what the target audience knows, their attitudes about the issues and contributing factors, and their practices. Without this information, intended outcomes and content are unlikely to address the needs of the target audience.

This step is subdivided into two parts: (1) procedures for conducting a needs assessment and (2) needs analysis. The results of the assessment are used to state intended outcomes and form evaluation strategies. After reviewing the procedures in this step. Curriculum team members will understand how to conduct a needs assessment and use the results to formulate intended outcomes.

NEEDS ASSESSMENT PROCEDURES

Needs assessment procedures include surveys and interviews conducted with members of the targeted audience and members in their communities. Members of the curriculum design team should be directly involved with gathering data. It is helpful to have a team member experienced in survey design and evaluation.

Team involvement in the assessment process produces content and methods relevant to the needs of the target audience. Similarly, if members from the target audience and potential facilitators are involved, the curriculum will be meaningful and relevant. KAP (*i.e.*, Knowledge, Attitudes, and Practices) is a needs assessment method developed by R. Adhikarya (FAO, 1994). It focuses on specific and critical elements of an issue and the knowledge, attitude, and practice levels of target audiences. The process gathers qualitative information about the target audience and the issues effecting them.

The reasons for attitudes and practices are discussed through focus groups, interviews and surveys. Information provided by a KAP survey is useful to formulate intended outcomes, to select content, and to design methods to meet the needs of the targeted audience.

The KAP survey generates information for four major steps in the curriculum development process:

1. Members of the targeted audience are consulted and provide information regarding their needs in relation to a specific problem;
2. Intended outcomes can be stated to relate to the specific needs of the targeted audience;
3. Baseline data can be used in formative evaluations to test the appropriateness of content and methods; and
4. A summative evaluation can compare baseline data to the outcomes from implemented curriculum.

A needs assessment identifies the target audience and the knowledge, attitude, and practice gaps. A needs assessment is conducted in five basic steps:

1. Conduct focus group discussions with key informants (leaders in the community) and with target audience groups (*i.e.*, rural out-of-school youth). The goals are to identify the key audience and their characteristics (*i.e.*, the predetermined audience does not apply to all cases); identify major problems areas (*e.g.*, overpopulation issues); determine the causes of the problems; and generate possible solutions.

   Sample Population Education Questions:
   1. What do you feel are the major issues or problems confronting rural out-of-school youth?
   2. What are the causes of these problems?
   3. How do they relate to overpopulation issues?
   4. What gaps (the difference between desired performance and actual practice) do you think exist in population related knowledge, attitudes, and practices among rural out-of-school youth?
   5. What are some possible solutions?
   6. Are there other major areas of concern or problems?

2. Identify major topics related to rural out-of-school youth from focus group discussions.

   A Sample of Population Education Issue Topics:
   • *Agricultural Production:* Large family farms are divided equally among many children resulting in small farms with insufficient income to support a family.
   • *Environment:* Forests art destroyed to provide additional land for agricultural production.

3. Develop a survey on the topics of concern generated that focus on target audience levels of knowledge, attitudes, and practices. The survey could be used in focus groups or in one-on-one interviews. Before you use the survey, test it to make sure the questions are valid (*i.e.*, they ask what they are intended to ask) and the responses are meaningful. For example, a common survey mistake is to ask more than one question in a question (*e.g.*, Do you know and practice eating balanced nutritional meals?). This makes no sense. What am I trying to find out? Do I want

to know if you know what constitutes a balanced meal or if you eat balanced nutritional meals? Sample questions in each area (knowledge, attitudes, and practices) might include:

"There are three broad reasons why people don't behave as expected or desired: Lack of:

— Knowledge or skills;
— Motivation;
— Organization and Environment" (FAO, 1993).

If a reason for not following certain practices is organizational or environmental (including cultural and/or moral values), it would be inappropriate to develop curriculum materials to change behaviour when education and training will not make a difference. For example, if an area is overpopulated and the dominant religious belief forbids the use of contraceptives, it is a misuse of resources to develop curriculum to teach about contraceptives and family planning techniques. One can not expect the intended outcomes to occur (*i.e.*, to reduce population through the use of contraceptives) by educational programmes when the barrier is organizational policy. A correctly conducted needs assessment would identify such problems long before intended outcomes are formulated.

Another method to assess needs is the Delphi technique. A representative panel of experts or leaders in the community (including members of the target audience) are asked to list the factors or aspects of an issue (*e.g.*, overpopulation). A composite list is compiled from all the lists and each panel member votes on their top priority items.

The results are tabulated and panel members are asked to vote again on their top priorities. This process is repeated until the prioritized list is agreed upon by the panel members. The advantage of this technique is that many aspects of the issue are explored and a number of people have been involved in identifying and prioritizing aspects of the issue. It provides a prioritized list of factors involved in the issue from the perspective of a number of people (both community and experts).

Town or village meetings can be conducted to obtain input on major issues and problems within the community. A recorder or objective observer takes notes of the discussion to be analysed later. The advantages of using this technique is its inclusiveness and community involvement through a public forum. The major disadvantage is that people who feel comfortable speaking in public and have strong opinions are heard while others who may be intimidated by numbers or by stronger opinions are not.

TRENDS IN CURRICULUM DEVELOPMENT

To understand contemporary curricular problems and proposals, it is ideal that we acquaint ourselves with the history of curricular thought and practice that stretches back to antiquity. However, let us start this chapter with the assumption that we rarely find histories that focus exclusively on curriculum and, therefore, turn to an overview of general histories of education in an effort

to get a few glimpses of the history of curriculum. The curriculum field may be viewed as a formal area of academic inquiry, but as a basic human interest, its concerns are perennial. Parents and other members of society throughout history have wondered how best to help their young ones grow and mature. Their response to this problem constitutes an unwritten history of informal curricular thought and action. As societies became more formal and as institutions developed within them to meet specialized needs, schools/colleges evolved to help students grow more efficiently, to introduce them to the ways of their society and to help them acquire an understanding of their cultural heritage.

If we recall the earlier sections, curriculum has always been and continues to be influenced by educational philosophers, besides societal needs. In the ancient times, though a formal curriculum (of the shape it has obtained today) did not exist; young people were oriented towards meeting cultural and social demands. Depending on the influence of educational philosophies, however, curriculum-content for such orientations varied from one period to the other. Tracing the historical antecedents of curriculum may give us a framework of its gradual growth. However, for our immediate purposes we shall restrict ourselves to an overview of the twentieth century curriculum and a speculation of the possible future trends in curriculum development.

Twentieth Century Curriculum

Early 20th century curriculum affirmed the shift in emphasis from sectarian education to liberal education. Traditionally, curriculum was confined to religion-related orientations and classics. Gradually, more and more subjects were added to the curriculum. As the focus was on mental discipline, social needs, student interest or capabilities were given little emphasis. Further, during this period, compartmentalization and not interdisciplinary subject matter was considered the norm. There was an unwillingness to recognize the values of arts, music, physical and vocational education. This was based on the theory that these subjects had little mental or disciplinary value. If we pause for a moment here and think, we shall realize that even though we offer vocational, industrial and/or technical programmes now, there is a tendency to consider traditional academic programmes superior to them.

Gradually, demands were made for curricular changes. Industrial development led a growing number of educators to question changes, as well as the authenticity of the traditional curriculum and its emphasis on mental discipline. This shift was also influenced by the scientific movement in child psychology (which focused on the whole child and learning theories in the 1900's).

The argument that classics had no greater disciplinary or mental value than other subjects eventually appeared and meant that mental discipline (which emphasized drill and memorization) was no longer considered conducive for the overall growth and development of children. In essence, societal changes and the emerging demands there from; the stress on psychology and science; and the concern for social and educational reform made evident the need for a new

curriculum. Thus, the aims of education went hand in hand with the particular type of society involved: conversely, the society that evolved influenced the aims of education.

Thus, the early twentieth century was a period of educational reform characterized by the following:

(i) Idea of mental discipline was replaced by utilitarian modes of thought and scientific inquiry.

(ii) Curriculum tended not to be compartmentalized but to be interdisciplinary.

(iii) Curriculum tended not to be static but dynamic-changing with the changes in society.

(iv) Needs and interest of students came to be considered of primary importance. And now curriculum is viewed as a science with principles and methodology not just as content or subject matter.

Possible Future Trends

Keeping in view the prevalent political, economic and academic climate, it is not difficult for us to visualize (of course, only to a certain extent) future trends and the influence they may have on education, particularly on curriculum development. (However, we should also confess here that such a speculation is fraught with risks that normally go with it.)

Although in this Unit we have been underlining the fact that social changes will have a vital role in determining a curriculum. If the present day growth of information is any indication the information flow will increase rapidly in the future. Clearly, the increasing flow of information negates the traditional notion of content-mastery. Students, therefore, will need to acquire critical thinking, and problem solving abilities rather than static and/or absolute knowledge and skills of factual recall.

Further, in the 21st centuries, the need for change will accelerate. For example, it took us more than one century to shift from an agricultural society to an industrial one. But it took hardly two decades to shift from an industrial to an information society.

What are the implications of these observations? Job patterns will constantly change dramatically and so workers will be moving frequently from one job to another. Accordingly, to keep them abreast with each task/job that they take up, we will need to give them periodic training. The speed of change we have been referring to suggests not only that fields will be dynamic, but also that new ones will emerge. By implication, education and orientation will, of necessity a lifelong process. In essence, unlike the past, we cannot consider our education complete just because we have attended schools/colleges or graduated from an educational institution. Nor will we be able to enter a job or profession and expect to remain in it for life without regular training.

Traditionally, organizations have followed hierarchical structuring with power and communication flowing in a pattern from top to bottom. Increasingly, however, centralized institutions are being replaced by smaller decentralized units. Much

of the impetus for this change has come from the inability of hierarchical structures to effectively solve problems. Rigid and efficient organizations are no longer as efficacious as fluid and flexible ones in which experimentations and autonomy call thrives. Applied to education, this kind of decentralization gives recognition to an individual's need for self-determination and ownership in the decision making processes.

What are the implications of the above discussion? In the main, there will be radical changes in the socio-academic ecology of school/college environment. Barring a few, if any, schools/colleges have so far been functioning as bastions of autocracy with little importance given to students' needs and teachers' competence. Because of the changing societal needs and greater awareness of the need for purpose-oriented education, the needs of every individual in the school/college will have to be recognized. In other words, there will be a change in the treatment of students as a homogeneous entity. Rapid growth in information will result in the emergence, every now and then, of varied curricula for purposes of reeducation and retaining. The number of consumers will obviously be more than the programmes available. In such a situation, the mode of the teaching/learning process cannot be the one which is prevalent now, *i.e.*, face-to-face. Obviously, a viable alternative mode is distance education.

A MODEL FOR RESEARCHING SYLLABUS DEVELOPMENT AND CURRICULUM CHANGE

This model developed from a study of changes in the social education syllabuses in NSW over a 22 year period from 1967 to 1989. The social education or SOSE area was examined from the perspective of how it changed over this period, why it changed and how the changes inform current practice. Although some may argue that the curriculum historian should perhaps be further removed from the study, the main impetus for me with this study was to inform my current practice. As Popkewitz points out: Our questions about the present require that we recognise that the present is not just our immediate experiences and practices. Part of our historical consciousness is to recognise that the past is a part of our everyday discourse, structuring what can be said and the possibilities and challenges of our times. I am the HSIE coordinator at the University of Newcastle and I work in the Early Childhood, Primary and Secondary programmes. There is a real need for me to have on overriding view removed from the minutae of day to day SOSE lesson planning in a particular syllabus area.

The model evolved from two directions. Firstly, from reading literature in the policy, curriculum, educational history, social science pedagogy, and sociology areas, and examining primary documents such as committee minutes. Secondly it evolved from talking to syllabus committee members from the period and reading their survey replies, and examining the syllabuses produced. There were nineteen interviews held and 61 surveys collected. The model is not wildly different from anything seen before and in fact is similar to Kenway's, for example, suggestion for categorising theories of policy making.

She argued that there were macro-theories encompassing an examination of the broader social and political context in which policy develops and the role of the state in this; middle-range theories which concentrate on the different stages of policy development and implementation; and micro-theories concerning decision making and decision makers within particular institutions. It is also important to examine the text of syllabus documents/policy documents.

ENVIRONMENT

The facets of the environment for syllabus development or syllabus change entail the political, economic, social and cultural factors of the period and the ideology in educational circles that is pre-eminent at the time. These are all inter-related. In the period of my study there was economic plenty followed by economic shortfall, social welfare programmes in abundance followed by cuts in social welfare programmes, a period of increased diversification of culture in the population of Australia as well as an acknowledgement of the Indigenous contribution to Australian culture and some major shifts in the thinking as to what mass education wanted to achieve. These were all factors shaping school syllabuses. There are a variety of studies that examine this aspect of curriculum development.

Studies such as those of Kliebard offer an explanation based on differing philosophies of education. In his view curriculum development in America was explained by three major reform movements arising at the turn of the twentieth century (the child-study movement, social efficiency educators and the social meliorists) that were aligned against the traditional humanist curriculum. He argued that the *humanists* wanted to maintain the status quo and were the guardians of a tradition linked to intellectual reasoning and thus to the Western cultural heritage. They exerted much power through their standing in the academic world. One group contesting the supremacy of the humanists in the curriculum was the *child-study movement*. Advocates promoted a curriculum reformed along the lines of the natural order of development of the child. They felt that the curriculum could be adapted to the natural needs and interests of the child and that the school should encourage but not direct the child. The second reform group, called by Kliebard the *social efficiency educators*, were strongly influenced by scientific methodology and were intent on creating an efficient, smoothly running society. Techniques of industry were to be applied to schools and the curriculum was to be made more directly functional to adult roles. The third reform group were the *social meliorists*. They saw the school as a major force for social change and social justice. This group came to the fore at the end of the 1920s and was associated with social educators like George Counts and Harold Rugg in the United States.

In Kliebard=s view, the present curriculum was the result of conflict among the four philosophies of education: In the end, what became the American curriculum was not the result of any decisive victory by any of the contending parties, but a loose, largely unarticulated, and not very tidy compromise.

Another researcher, Goodson examined the development of geography, biology, 'rural studies' and 'environmental studies' as they became established subjects in schools. He postulated that school subjects belonged to one of three traditions B academic, utilitarian or pedagogic, and advocates of these subjects used these traditions at various times to advocate their subjects and to defend them against contenders. As an example, here in Australia the debate between the traditional History teachers and those teachers advocating the New History approach in the 1970s could reflect a debate between academic and the utilitarian philosophies.

In the area of social education specifically, Johnson pointed out that the aim of the field he calls social studies varies between educating for social commitment to educating for social comprehension. Similarly Wheeler argues that curriculum aims may be put into two broad categories B aims concerned with producing a certain type of person, and aims concerned with producing people capable of fulfilling a certain role=.

The above studies provide explanation primarily from a philosophical standpoint. There are many studies, particularly those based in the policy field, which provide a close examination of the specific political, cultural and economic forces influencing the school curriculum. Cornbleth and Waugh=s study of the implementation of social studies curriculum in New York and California demonstrated not only the clashing ideologies associated with the portrayal of multicultural America, but also the economic and political background, and the various factions associated with these different views.

Aldrich provides evidence of the political and economic forces involved in developing the National Curriculum as well as its conservative, nation-building citizenship focus. A similar theme is echoed by Phillips= study of the increased emphasis on a traditional view of national culture in the curriculum. On the other hand, Ball and Bowe criticised the economic, market-led rationale of the National Curriculum. Ball considers implications of both of these facets of curriculum making in his *Education Reform: A Critical and Post-Structural Approach*.

Closer to home, the Australian national profiling exercise, a homegrown version of a national curriculum, has been examined from the viewpoints of the political, economic and social forces involved. Kennedy identified economic imperatives as encouraging curriculum initiatives in Great Britain, the United States and Australia in the late 1980s while Green and Beavis argue that nationalism and a concern to build an >Australian= identity and citizenship is a thread running through Australian syllabuses in English. Reports such as that of the *Civics Expert Group* promote similar views in history syllabuses.

PROCESS EXPLANATIONS

All change cannot be explained by the environment. Syllabus committees are sometimes sheltered from the economic and social realities by administrative contraints or processes. In the 1970s syllabuses were devised in skeletal form

to enable teachers to create relevant school-based programmes. In the social science area they often incorporated inquiry approaches and encouraged higher conceptual levels of understanding. These appeared in a period when funds for schools were being cut and there was little professional support for implementation. The documents were out of sync with the economic, political and social environment and as a consequence some schools floundered.

Ball developed a schema of associated factors needed for any meaningful analysis of change in policy-making in education. He argued that the relations of change B the power struggles between social groups and the differing vested interests, resources and influence; and the structures of change B the institutions, organisations, procedures, roles and formal channels of a policy making were important facets for analysis. Bowe, Ball and Gold argued that syllabuses were the result of struggle and compromise made up of >groups of actors working within different sites...(and) in competition for control of the representation of policy=. At this level of understanding of curriculum change, Creighton noted a number of limitations of decision-making within committees.

These included failure to give systematic coverage to issues, members pushing their predetermined conclusions, proneness to reject innovations, personal feelings of members that they are reluctant to reveal, excessive time taken to make decisions, domination by a few members, and the production of superficial findings and group conformity in order to accommodate all interests.

Various groups are instrumental in promoting change in school subjects. Goodson pointed to the importance of university pressure groups particularly in providing the academic status that seemed to be so important for a subject in establishing school-based esteem, and which in turn encouraged students to take a particular subject. In his examination of the development of modern languages Radford indicated that the lack of academic prestige afforded to modern languages in the nineteenth century, even when offered at Cambridge in 1886, delayed the introduction of such study in schools. Universities also exert indirect influence on school subjects through control of developments in the subject field, through the preparation of teachers, the publication of textbooks in the field, and the establishment of entrance requirements into university courses. For a large part of this century in NSW, the University of Sydney had considerable influence on secondary school syllabuses.

The professional associations also are influential in the development of school subjects. Ball noted the National Association for the Teaching of English in the 1960s and 1970s and its influence on school curricula. McCulloch examined the considerable role of the Association of Heads of Secondary Technical Schools in promoting curriculum for technical education in England. Likewise Goodson recognised the importance of the Association of Teachers of Gardening and Rural Subjects in the promotion of rural studies. Teacher associations were not the only groups involved in negotiating school syllabuses. Whitty recognised lobbying of the Royal Geographical Society against social studies in secondary modern schools in the 1950s.

Cooper, in his study of a new mathematics curriculum in the United Kingdom, found the personal relations between people pursuing the various segments of the subject (with their distinct perspectives and material interests), and their alliances with groups inside and outside the subject as the major factors in explaining change in that area. Similarly, Lybarger found that a number of people on the 1916 Committee on Social Studies in the United States were interested in charity work, partly explaining the reasoning behind that committee's argument that the >needs= of students should be criterion when devising social studies curriculum.

Administrative structures also influence school curriculum. In a study by Stray, the change from grammar-school to comprehensive school resulted in changes in the administrative hierarchy whereby pastoral concerns as opposed to subject specialist concerns became of major importance. In his study in one school in the 1970s, this administrative change led to the downgrading of classics education.

Australian studies of curriculum find that administrative concerns feature prominently. Young showed that the Board of Studies (BOS), the curriculum committee of the Board, the Key Learning Curriculum Committee for Human Society and Its Environment, the Years 7-10 History syllabus committee, professional historians, historical and professional associations were all instrumental in producing a new junior history syllabus in New South Wales in 1990. However, the Board of Studies had mandated the hours to be devoted to history and had decreed that a Key Learning structure would be established and it was these administrative constraints that were the major forces in developing a syllabus document.

Brock, in his study of the development of secondary English curriculum in New South Wales, also noted the importance of the directives from the Secondary Schools Board (SSB) when designing syllabuses, particularly in allocating content for particular levels of study. In an earlier period Graham specified the importance of the Inspector-General and his team of school inspectors in establishing curriculum in Western Australia. Also in Western Australia, but in a different era, Marsh pointed to the influence of the Education Department and the External Examination and Certification Boards, as well as the professional associations, the tertiary institutions, and the textbook publishers and authors on the development of a senior school geography curriculum. The list grows even longer in his later study of groups and influences involved in the National profiling exercise, with Federal agencies, national commissions and councils, and state accreditation and assessment agencies often playing a large part in the process.

What has become most obvious, however, is the increased role of politicians in curriculum development. There was some foretaste of this in the 1970s with the intervention of the Premier of Queensland and the consequent banning of Man: A Course of Study (MACOS) in schools, because of pressure from conservative religious groups. Winder found that in NSW, curriculum was

influenced by direct party politics, the electoral platform policies of a political party and policy created by an oligarchy within a party. He also found that interest groups, such as teacher unions and parent organisations, and the bureaucracy, also affect education policies.

INDIVIDUALS

Archer wrote of the >politics of aggregation= or the >dumb pressure of numbers= whereby educational demography is shaped by the sum of unorganised individual actions. There are a number of studies of the individuals involved in curriculum change. Ivor Goodson and Rob Walker edited a collection of studies of curriculum in 1991, exploring the historical changes in curriculum study since the 1970s. Their overall theme was that people play a central role in the educational process and in educational systems. The focus on the personal nature of action and interaction was a point of access into broader social contexts and structures. As an example, Goodson=s study of the school subject rural studies explored the development of a school subject that was, in the 1920s, a utilitarian subject based on gardening, through to its being offered in A and O levels within environmental studies in the 1970s. He collected the life histories of the innovators of change in the subject as well as those who represented the traditions of the subject.

One aspect of the personal side of syllabus construction is the importance that teachers attach to their teaching subject. Teachers= identities can be established by their teaching subjects and their various teaching methods. Changes to these can sometimes be seen as personal threats.

David Warren Saxe examined the social construction of social studies in *Social Studies in Schools*. He examined the documentation of the establishment of 'social studies' as a school subject but also looked at the role of particular personalities and their individual interests. Cooper, in his study of a new mathematics curriculum in the United Kingdom, saw relations among people pursuing the various segments of the subject, and their alliances with groups inside and outside the subject, as the major explanatory factor for changes in the curriculum. Issues such as perceived career consequences for individuals also affected curriculum change.

The danger with a narrow focus on the people involved in the process is that it can atomise the study and make what is a very complex issue seem too simple. Goodson not only collected the life histories of the innovators of change in the school subject, as well as those who represented the traditions of the subject, but also developed a detailed documentary history of the school subject and of the conflicts over the innovations.

He saw the combination of a group of life stories and a subject history as a strategy to triangulate the data and thereby strengthen the findings. As he noted curriculum change comes from 'a story of action within a theory of context'. No doubt we can all name an insightful or enterprising individual who appears to have a major force on curriculum development at some point.

SYLLABUS TEXT

The text of syllabus documents can be deconstructed. The term >deconstruction = was first coined by Derrida to indicate the relationship between experience and language. He argued that deconstruction of text lays bare the construction of the text and reveals multitudes of meanings and interpretations. It is not simply understood as ideologically constructed, but is seen as a series of narratives superimposed upon each other with layers of story merged and separated. Wade has categorised studies analysing school texts in these ways as being divided into three major types:

A. There are those studies where the purpose is to describe the attributes of a given topic such as those that attempt to ascertain the extent to which nuclear war is mentioned in texts. In my study this entailed tracking certain concepts and themes through a variety of syllabuses. For example none of the History syllabuses mentioned > poverty = or >wealth=. Nor was >duty=,> morality=, > justice= or >welfare= considered in history syllabuses. It seems that social values were not stressed in history syllabuses of this period whereas in the early 1970s these terms began to emerge at least in junior Geography.

B. Then there are studies whose purpose is to make inferences about the causes of the findings, for example, Gilbert=s study of school syllabuses and texts to ascertain the underlying ideology of these texts. It is interesting that the term >Modern History=has meant different things at different periods of time. The 1962 junior history course was called modern history and it began in 1450.

The 1978 senior modern history syllabus began in the 18th century with the French Revolution. Many of the arguments held in the syllabus committee in the early 1980s centred around the issue of when modern history really began. Could >modern= be later than the French Revolution? The 1982 junior syllabus claimed that twentieth century world history was valuable as an aid to >assist students to understand their present world=, seeming to imply that only knowledge of the twentieth century was important to contemporary life. Thus, while attempting to make their study contemporary and relevant to current society, historians were on shifting ground in defining the content of history. This represented changes in the philosophy behind what was being taught.

C. Lastly there are those whose purpose is that of making inferences about the effects of text upon students, for example, Luke=s study of the influence of the Dick and Jane school texts on social relations and perceptions of what counted as appropriate reading. And what of Geography as an active study of the local area? In the 1966 junior Geography syllabus teachers were encouraged to promote interest by; >the use of >active= methods, such as observation outside the classroom, practical work in the construction and interpretation of maps and graphs, and description from photographs and films=.

However terms associated with student activity began to disappear from the syllabus. The 1975 syllabus incorporated the skill of >observation and recognition of phenomena in real and representative form= but it tended to emphasise cognitive skills. Although the words >experience= or >active= are rarely used in the 1984 syllabus the photographs in this syllabus emphasise the active nature of geographic study. By adding a different media to the language a different perception of the intended study can be gained. Without the photographs it appears that the child=s own experiences were not very important in the study of geography. The pictures and the text send out different messages. This is a fascinating example of how either pictures or language can belie intended meaning.

CURRICULUM AS A SYLLABUS TO BE TRANSMITTED

Many people still equate a curriculum with a syllabus. Syllabus, naturally, originates from the Greek (although there was some confusion in its usage due to early misprints). Basically it means a concise statement or table of the heads of a discourse, the contents of a treatise, the subjects of a series of lectures. In the form that many of us will have been familiar with it is connected with courses leading to examinations – teachers talk of the syllabus associated with, say, the Cambridge Board French GSCE exam. What we can see in such documents is a series of headings with some additional notes which set out the areas that may be examined.

A syllabus will not generally indicate the relative importance of its topics or the order in which they are to be studied. In some cases as Curzon (1985) points out, those who compile a syllabus tend to follow the traditional textbook approach of an 'order of contents', or a pattern prescribed by a 'logical' approach to the subject, or – consciously or unconsciously – a the shape of a university course in which they may have participated. Thus, an approach to curriculum theory and practice which focuses on syllabus is only really concerned with content. Curriculum is a body of knowledge-content and/or subjects. Education in this sense, is the process by which these are transmitted or 'delivered' to students by the most effective methods that can be devised (Blenkin et al 1992: 23).

Where people still equate curriculum with a syllabus they are likely to limit their planning to a consideration of the content or the body of knowledge that they wish to transmit. 'It is also because this view of curriculum has been adopted that many teachers in primary schools', Kelly (1985: 7) claims, 'have regarded issues of curriculum as of no concern to them, since they have not regarded their task as being to transmit bodies of knowledge in this manner'.

CURRICULUM AS PRODUCT

The dominant modes of describing and managing education are today couched in the productive form. Education is most often seen as a technical exercise.

Objectives are set, a plan drawn up, then applied, and the outcomes (products) measured. It is a way of thinking about education that has grown in influence in the United Kingdom since the late 1970s with the rise of vocationalism and the concern with competencies. Thus, in the late 1980s and the 1990s many of the debates about the National Curriculum for schools did not so much concern how the curriculum was thought about as to what its objectives and content might be.

It is the work of two American writers Franklin Bobbitt (1918; 1928) and Ralph W. Tyler (1949) that dominate theory and practice within this tradition. In *The Curriculum* Bobbitt writes as follows:

The central theory [of curriculum] is simple. Human life, however varied, consists in the performance of specific activities. Education that prepares for life is one that prepares definitely and adequately for these specific activities. However numerous and diverse they may be for any social class they can be discovered. This requires only that one go out into the world of affairs and discover the particulars of which their affairs consist. These will show the abilities, attitudes, habits, appreciations and forms of knowledge that men need. These will be the objectives of the curriculum. They will be numerous, definite and particularized. The curriculum will then be that series of experiences which children and youth must have by way of obtaining those objectives. (1918: 42)

This way of thinking about curriculum theory and practice was heavily influenced by the development of management thinking and practice. The rise of 'scientific management' is often associated with the name of its main advocate F. W. Taylor. Basically what he proposed was greater division of labour with jobs being simplified; an extension of managerial control over all elements of the workplace; and cost accounting based on systematic time-and-motion study. All three elements were involved in this conception of curriculum theory and practice. For example, one of the attractions of this approach to curriculum theory was that it involved detailed attention to what people needed to know in order to work, live their lives and so on. A familiar, and more restricted, example of this approach can be found in many training programmes, where particular tasks or jobs have been analyzed – broken down into their component elements – and lists of competencies drawn up. In other words, the curriculum was not to be the result of 'armchair speculation' but the product of systematic study. Bobbitt's work and theory met with mixed responses. One telling criticism that was made, and can continue to be made, of such approaches is that there is no social vision or programme to guide the process of curriculum construction. As it stands it is a technical exercise. However, it wasn't criticisms such as this which initially limited the impact of such curriculum theory in the late 1920s and 1930s. Rather, the growing influence of 'progressive', child-centred approaches shifted the ground to more romantic notions of education. Bobbitt's long lists of objectives and his emphasis on order and structure hardly sat comfortably with such forms.

The Progressive movement lost much of its momentum in the late 1940s in the United States and from that period the work of Ralph W. Tyler, in particular,

has made a lasting impression on curriculum theory and practice. He shared Bobbitt's emphasis on rationality and relative simplicity. His theory was based on four fundamental questions:

1. What educational purposes should the school seek to attain?
2. What educational experiences can be provided that are likely to attain these purposes?
3. How can these educational experiences be effectively organized?
4. How can we determine whether these purposes are being attained? (Tyler 1949: 1)

Like Bobbitt he also placed an emphasis on the formulation of behavioural objectives. Since the real purpose of education is not to have the instructor perform certain activities but to bring about significant changes in the students' pattern of behaviour, it becomes important to recognize that any statements of objectives of the school should be a statement of changes to take place in the students. (Tyler 1949: 44)

The attraction of this way of approaching curriculum theory and practice is that it is systematic and has considerable organizing power. Central to the approach is the formulation of behavioural objectives – providing a clear notion of outcome so that content and method may be organized and the results evaluated.

There are a number of issues with this approach to curriculum theory and practice. The first is that the plan or programme assumes great importance. For example, we might look at a more recent definition of curriculum as: 'A programme of activities (by teachers and pupils) designed so that pupils will attain so far as possible certain educational and other schooling ends or objectives (Grundy 1987: 11). The problem here is that such programmes inevitably exist prior to and outside the learning experiences. This takes much away from learners. They can end up with little or no voice. They are told what they must learn and how they will do it. The success or failure of both the programme and the individual learners is judged on the basis of whether pre-specified changes occur in the behaviour and person of the learner (the meeting of behavioural objectives). If the plan is tightly adhered to, there can only be limited opportunity for educators to make use of the interactions that occur. It also can deskill educators in another way. For example, a number of curriculum programmes, particularly in the USA, have attempted to make the student experience 'teacher proof'. The logic of this approach is for the curriculum to be designed outside of the classroom or school, as is the case with the National Curriculum in the UK. Educators then apply programmes and are judged by the products of their actions. It turns educators into technicians.

Second, there are questions around the nature of objectives. This model is hot on measurability. It implies that behaviour can be objectively, mechanistically measured. There are obvious dangers here – there always has to be some uncertainty about what is being measured. We only have to reflect on questions of success in our work. It is often very difficult to judge what the impact of

particular experiences has been. Sometimes it is years after the event that we come to appreciate something of what has happened. For example, most informal educators who have been around a few years will have had the experience of an ex-participant telling them in great detail about how some forgotten event (forgotten to the worker that is) brought about some fundamental change. Yet there is something more.

In order to measure, things have to be broken down into smaller and smaller units. The result, as many of you will have experienced, can be long lists of often trivial skills or competencies. This can lead to a focus in this approach to curriculum theory and practice on the parts rather than the whole; on the trivial, rather than the significant. It can lead to an approach to education and assessment which resembles a shopping list. When all the items are ticked, the person has passed the course or has learnt something. The role of overall judgment is somehow sidelined.

Third, there is a real problem when we come to examine what educators actually do in the classroom, for example. Much of the research concerning teacher thinking and classroom interaction, and curriculum innovation has pointed to the lack of impact on actual pedagogic practice of objectives. One way of viewing this is that teachers simply get it wrong – they ought to work with objectives. I think we need to take this problem very seriously and not dismiss it in this way. The difficulties that educators experience with objectives in the classroom may point to something inherently wrong with the approach – that it is not grounded in the study of educational exchanges. It is a model of curriculum theory and practice largely imported from technological and industrial settings. Fourth, there is the problem of unanticipated results. The focus on pre-specified goals may lead both educators and learners to overlook learning that is occurring as a result of their interactions, but which is not listed as an objective.

The apparent simplicity and rationality of this approach to curriculum theory and practice, and the way in which it mimics industrial management have been powerful factors in its success. A further appeal has been the ability of academics to use the model to attack teachers: I believe there is a tendency, recurrent enough to suggest that it may be endemic in the approach, for academics in education to use the objectives model as a stick with which to beat teachers. 'What are your objectives?' is more often asked in a tone of challenge than one of interested and helpful inquiry. The demand for objectives is a demand for justification rather than a description of ends… It is not about curriculum design, but rather an expression of irritation in the problems of accountability in education. (Stenhouse 1974: 77) So what are the other alternatives?

Curriculum as Process

We have seen that the curriculum as product model is heavily dependent on the setting of behavioural objectives. The curriculum, essentially, is a set of documents for implementation. Another way of looking at curriculum theory

and practice is via process. In this sense curriculum is not a physical thing, but rather the interaction of teachers, students and knowledge. In other words, curriculum is what actually happens in the classroom and what people do to prepare and evaluate. What we have in this model is a number of elements in constant interaction. It is an active process and links with the practical form of reasoning set out by Aristotle.

Curriculum as Process

Teachers enter particular schooling and situations withan ability to think critically, -in-actionan understanding of their role and the expectations others have of them, anda proposal for action which sets out essential principles and features of the educational encounter. Guided by these, they encourage conversations between, and with, people in the situation out of which may come thinking and action. They continually evaluate the process and what they can see of outcomes.

Perhaps the two major things that set this apart from the model forinformal education are first, the context in which the process occurs ('particular schooling situations'); and second, the fact that teachers enter the classroom or any other formal educational setting with a more fully worked-through idea of what is about to happen. Here I have described that as entering the situation with 'a proposal for action which sets out essential principles and features of the educational encounter'.

This form of words echoes those of Lawrence Stenhouse (1975) who produced one of the best-known explorations of a process model of curriculum theory and practice. He defined curriculum tentatively: 'A curriculum is an attempt to communicate the essential principles and features of an educational proposal in such a form that it is open to critical scrutiny and capable of effective translation into practice'. He suggests that a curriculum is rather like a recipe in cookery.

It can be criticized on nutritional or gastronomic grounds – does it nourish the students and does it taste good? – and it can be criticized on the grounds of practicality – we can't get hold of six dozen larks' tongues and the grocer can't find any ground unicorn horn! A curriculum, like the recipe for a dish, is first imagined as a possibility, then the subject of experiment. The recipe offered publicly is in a sense a report on the experiment. Similarly, a curriculum should be grounded in practice. It is an attempt to describe the work observed in classrooms that it is adequately communicated to teachers and others. Finally, within limits, a recipe can varied according to taste. So can a curriculum. (Stenhouse 1975: 4-5)

Stenhouse shifted the ground a little bit here. He was not saying that curriculum is the process, but rather the means by which the experience of attempting to put an educational proposal into practice is made available. The reason why he did this, I suspect, is that otherwise there is a danger of widening the meaning of the term so much that it embraces almost everything and hence means very little. For example, in a discussion of the so-called 'youth work

curriculum' (Newman & Ingram 1989), the following definition was taken as a starting point: 'those processes which enhance or, if they go wrong, inhibit a person's learning'. This was then developed and a curriculum became: 'an organic process by which learning is offered, accepted and internalized' (Newman & Ingram 1989: 1). The problem with this sort of definition, as Robin Barrow (1984) points out, is that what this does is to widen the meaning of the term to such an extent that it just about becomes interchangeable with 'education' itself. More specifically, if curriculum is process then the word curriculum is redundant because process would do very nicely! The simple equation of curriculum with process is a very slap-happy basis on which to proceed.

We also need to reflect on why curriculum theory and practice came into use by educators (as against policy-makers). It was essentially as a way of helping them to think about their work before, during and after interventions; as a means of enabling educators to make judgments about the direction their work was taking. This is what Stenhouse was picking up on.

Stenhouse on Curriculum

As a minimum, a curriculum should provide a basis for planning a course, studying it empirically and considering the grounds of its justification. It should offer: A. In planning:1. Principle for the selection of content – what is to be learned and taught2. Principles for the development of a teaching strategy – how it is to be learned and taught.3. Principles for the making of decisions about sequence.4. Principles on which to diagnose the strengths and weaknesses of individual students and differentiate the general principles 1, 2 and 3 above, to meet individual cases. B. In empirical study:1. Principles on which to study and evaluate the progress of students.2. Principles on which to study and evaluate the progress of teachers.3. Guidance as to the feasibility of implementing the curriculum in varying school contexts, pupil contexts, environments and peer-group situations.4. Information about the variability of effects in differing contexts and on different pupils and an understanding of the causes of the variation. C. In relation to justification: A formulation of the intention or aim of the curriculum which is accessible to critical scrutiny. Stenhouse 1975: 5

There are a number of contrasts in this model of curriculum theory and practice as compared with the product model. First, where the product model appeals to the workshop for a model, this process model looks to the world of experimentation.

The idea is that of an educational science in which each classroom is a laboratory, each teacher a member of the scientific community… The crucial point is that the proposal is not to be regarded as an unqualified recommendation but rather as a provisional specification claiming no more than to be worth putting to the test of practice, Such proposals claim to be intelligent rather than correct. (Stenhouse 1975: 142)

Thus, in this sense, a curriculum is a particular form of specification about the practice of teaching. It is not a package of materials or a syllabus of ground

to be covered. 'It is a way of translating any educational idea into a hypothesis testable in practice. It invites critical testing rather than acceptance' (Stenhouse 1975: 142).

Second, and associated with the above, given the uniqueness of each classroom setting, it means that any proposal, even at school level, needs to be tested, and verified by each teacher in his/her classroom (*ibid*: 143). It is not like a curriculum package which is designed to be delivered almost anywhere.

Third, outcomes are no longer the central and defining feature. Rather than tightly specifying behavioural objectives and methods in advance, what happens in this model of curriculum theory and practice is that content and means develop as teachers and students work together.

Fourth, the learners in this model are not objects to be acted upon. They have a clear voice in the way that the sessions evolve. The focus is on interactions. This can mean that attention shifts from teaching to learning. The product model, by having a pre-specified plan or programme, tends to direct attention to teaching. For example, how can this information be got over? A process approach to curriculum theory and practice, it is argued by writers like Grundy (1987), tends towards making the process of learning the central concern of the teacher. This is because this way of thinking emphasizes interpretation and meaning-making. As we have seen each classroom and each exchange is different and has to be made sense of.

However, when we come to think about this way of approaching curriculum in practice, a number of possible problems do arise. The first is a problem for those who want some greater degree of uniformity in what is taught.

This approach to the theory of curriculum, because it places meaning-making and thinking at its core and treats learners as subjects rather than objects, can lead to very different means being employed in classrooms and a high degree of variety in content. As Stenhouse comments, the process model is essentially a critical model, not a marking model.

It can never be directed towards an examination as an objective without loss of quality, since the standards of the examination then override the standards immanent in the subject. This does not mean that students taught on the process model cannot be examined, but it does mean that the examinations must be taken in their stride as they pursue other aspirations. And if the examination is a by-product there is an implication that the quality the student shows in it must be an under-estimate of his real quality. It is hence rather difficult to get the weak student through an examination using a process model. Crammers cannot use it, since it depends upon a commitment to educational aims. (Stenhouse 1975: 95)

To some extent variation is limited by factors such as public examinations. The exchange between students and teachers does not float free of the context in which it arises.

At the end of the day many students and their families place a high premium on exam or subject success and this inevitably enters into the classroom. This

highlights a second problem with the model we have just outlined – that it may not pay enough attention to the context in which learning takes place (more of this later).

Third, there is the 'problem' of teachers. The major weakness and, indeed, strength of the process model is that it rests upon the quality of teachers. If they are not up to much then there is no safety net in the form of prescribed curriculum materials. The approach is dependent upon the cultivation of wisdom and meaning-making in the classroom.

If the teacher is not up to this, then there will be severe limitations on what can happen educationally. There have been some attempts to overcome this problem by developing materials and curriculum packages which focus more closely on the 'process of discovery' or 'problem-solving', for example in science. But there is a danger in this approach. Processes become reduced to sets of skills – for example, how to light a bunsen burner.

When students are able to demonstrate certain skills, they are deemed to have completed the process. As Grundy comments, the actions have become the ends; the processes have become the product. Whether or not students are able to apply the skills to make sense of the world around them is somehow overlooked (Grundy 1987: 77).

Fourth, we need to look back at our process model of curriculum theory and practice and what we have subsequently discussed, and return to Aristotle and to Freire.

The model we have looked at here does not fully reflect the process explored earlier. In particular, it does not make explicit the commitments associated with phronesis. And it is to that we will now turn.

Curriculum as Praxis

Curriculum as praxis is, in many respects, a development of the process model. While the process model is driven by general principles and places an emphasis on judgment and meaning making, it does not make explicit statements about the interests it serves. It may, for example, be used in such a way that does not make continual reference to collective human well-being and to the emancipation of the human spirit. The praxis model of curriculum theory and practice brings these to the centre of the process and makes an explicit commitment to emancipation. Thus action is not simply informed, it is also committed. It is praxis.

Critical pedagogy goes beyond situating the learning experience within the experience of the learner: it is a process which takes the experiences of both the learner and the teacher and, through dialogue and negotiation, recognizes them both as problematic… [It] allows, indeed encourages, students and teachers together to confront the real problems of their existence and relationships… When students confront the real problems of their existence they will soon also be faced with their own oppression. (Grundy 1987: 105). We can amend our 'curriculum as process' model to take account of these concerns.

Curriculum as Praxis

Teachers enter particular schooling and situations with a personal, but shared idea of the good and a commitment to human emancipation, an ability to think critically, -in-action an understanding of their role and the expectations others have of them, and a proposal for action which sets out essential principles and features of the educational encounter.

Guided by these, they encourage conversations between, and with, people in the situation out of which may come informed and committed action.

They continually evaluate the process and what they can see of outcomes. In this approach the curriculum itself develops through the dynamic interaction of action and reflection. 'That is, the curriculum is not simply a set of plans to be implemented, but rather is constituted through an active process in which planning, acting and evaluating are all reciprocally related and integrated into the process' (Grundy 1987: 115). At its centre is *praxis*: informed, committed action.

How might we recognize this? First, I think we should be looking for practice which does not focus exclusively on individuals, but pays careful attention to collective understandings and practices and to structural questions. For example, in sessions which seek to explore the experiences of different cultural and racial groups in society, we could be looking to see whether the direction of the work took people beyond a focus on individual attitudes. Are participants confronting the material conditions through which those attitudes are constituted, for example?

Second, we could be looking for a commitment expressed in action to the exploration of educators' values and their practice. Are they, for example, able to say in a coherent way what they think makes for human well-being and link this with their practice? We could also be looking for certain values – especially an emphasis on human emancipation.

Third, we could expect practitioners committed to praxis to be exploring their practice with their peers. They would be able to say how their actions with respect to particular interventions reflected their ideas about what makes for the good, and to say what theories were involved.

Curriculum in Context

To round off this discussion of curriculum we do need to pay further attention to the social context in which it is created. One criticism that has been made of the praxis model (especially as it is set out by Grundy) is that it does not place a strong enough emphasis upon context. This is a criticism that can also be laid at the door of the other approaches. In this respect the work of Catherine Cornbleth (1990) is of some use. She sees curriculum as a particular type of process.

Curriculum for her is what actually happens in classrooms, that is, 'an ongoing social process comprised of the interactions of students, teachers, knowledge and milieu' (1990: 5). In contrast, Stenhouse defines curriculum as the attempt

to describe what happens in classrooms rather than what actually occurs. Cornbleth further contends that curriculum as practice cannot be understood adequately or changed substantially without attention to its setting or context. Curriculum is contextually shaped. While I may quibble about the simple equation of curriculum with process, what Cornbleth does by focusing on the interaction is to bring out the significance of context.

First, by introducing the notion of milieu into the discussion of curriculum she again draws attention to the impact of some factors that we have already noted. Of especial significance here are examinations and the social relationships of the school – the nature of the teacher-student relationship, the organization of classes, streaming and so on. These elements are what are sometimes known as the hidden curriculum. This was a term credited to Philip W. Jackson (1968) but it had been present as an acknowledged element in education for some time before. For example, John Dewey in *Experience and Education* referred to the 'collateral learning' of attitudes that occur in schools, and that may well be of more long-range importance than the explicit school curriculum (1938: 48). A fairly standard (product) definition of the 'hidden curriculum' is given by Vic Kelly. He argues it is those things which students learn, 'because of the way in which the work of the school is planned and organized but which are not in themselves overtly included in the planning or even in the consciousness of those responsible for the school arrangements (1988: 8). The learning associated with the 'hidden curriculum' is most often treated in a negative way. It is learning that is smuggled in and serves the interests of the status quo. The emphasis on regimentation, on bells and time management, and on streaming are sometimes seen as preparing young people for the world of capitalist production. What we do need to recognize is that such 'hidden' learning is not all negative and can be potentially liberating. 'In so far as they enable students to develop socially valued knowledge and skills… or to form their own peer groups and subcultures, they may contribute to personal and collective autonomy and to possible critique and challenge of existing norms and institutions' (Cornbleth 1990: 50). What we also need to recognize is that by treating curriculum as a contextualized social process, the notion of hidden curriculum becomes rather redundant. If we need to stay in touch with milieu as we build curriculum then it is not hidden but becomes a central part of our processes.

Second, by paying attention to milieu, we can begin to get a better grasp of the impact of structural and socio-cultural process on teachers and students. As Cornbleth argues, economic and gender relations, for example, do not simply bypass the systemic or structural context of curriculum and enter directly into classroom practice. They are mediated by intervening layers of the education system (Cornbleth 1990: 7). Thus, the impact of these factors may be quite different to that expected.

Third, if curriculum theory and practice is inextricably linked to milieu then it becomes clear why there have been problems about introducing it into non-schooling contexts like youth work; and it is to this area which we will now turn.

Curriculum as the Boundary between Formal and Informal Education

Jeffs and Smith (1990; 1999) have argued that the notion of curriculum provides a central dividing line between formal and informal education. They contend that curriculum theory and practice was formed within the schooling context and that there are major problems when it is introduced into informal forms of pedagogy.

The adoption of curriculum theory and practice by some informal educators appears to have arisen from a desire to be clear about content. Yet there are crucial difficulties with the notion of curriculum in this context. These centre around the extent to which it is possible to have a clear idea, in advance (and even during the process), of the activities and topics that will be involved in a particular piece of work.

At any one time, outcomes may not be marked by a high degree of specificity. In a similar way, the nature of the activities used often cannot be predicted. It may be that we can say something about how the informal educator will work. However, knowing in advance about broad processes and ethos isn't the same as having a knowledge of the programme. We must, thus, conclude that approaches to the curriculum which focus on objectives and detailed programmes appear to be incompatible with informal education.

In other words, they are arguing that a product model of curriculum is not compatible with the emphasis on process and praxis within informal education.

However, process and praxis models of curriculum also present problems in the context of informal education. If you look back at at our models of process and compare them with the model of informal education presented above then it is clear that we can have a similar problem with pre-specification. One of the key feature that differentiates the two is that the curriculum model has the teacher entering the situation with a proposal for action which sets out the essential principles and features of the educational encounter. Informal educators do not have, and do not need, this element. They do not enter with a clear proposal for action. Rather, they have an idea of what makes for human well-being, and an appreciation of their overall role and strategy (strategy here being some idea about target group and broad method *e.g.*, detached work). They then develop their aims and interventions in interaction. And what is this element we have been discussing? It is nothing more nor less than what Stenhouse considers to be a curriculum!

The other key difference is context. Even if we were to go the whole hog and define curriculum as process there remain substantive problems. As Cornbleth (1990), and Jeffs and Smith (1990, 1999) have argued, curriculum cannot be taken out of context, and the context in which it was formed was the school. Curriculum theory and practice only makes sense when considered alongside notions like class, teacher, course, lesson and so on. You only have to look at the language that has been used by our main proponents: Tyler, Stenhouse, Cornbleth and Grundy, to see this. It is not a concept that stands on its own. It developed in relation to teaching and within particular organizational relationships and

expectations. Alter the context and the nature of the process alters. We then need different ways of describing what is going on. Thus, it is no surprise that when curriculum theory and practice are introduced into what are essentially informal forms of working such as youth work and community work, their main impact is to formalize significant aspects of the work. One of the main outcome of curriculum experiments within youth work has been work, for example in the field of health promotion, which involve pre-specified activities, visiting workers, regular meetings and so on. Within the language of youth work these are most often called programmes or projects (Foreman 1990). Within a school they would be called a course.

4

Principles of Curriculum Development

This chapter is about the principles of curriculum development. While you are studying curriculum development and its need and importance you should be aware of the principles of curriculum development. This is because these principles help you when you yourself are up to the task of curriculum development. From B.Ed. point of view this topic comes in the study of pedagogy of various subjects and under subject Knowledge and curriculum. You might also consider visiting the article on Bases of curriculum.

- In curriculum development, we think about the type of learning experiences to be given to a child at various age and grade levels.
- It needs systematic and sequential planning to widen the sphere of the learning experience at each level by keeping in view the principles of integration and correlation.
- The curriculum is usually concerned with two questions
    1. What should we teach? What should be the content of education?
    2. How should we organize it and how should we teach?

To answer these questions we should now discuss the principles of curriculum development.

(a) *Suitability to the age and mental level of the children:*
- What is to be given to the children in the form of learning experiences at a particular age and grade level should suit their age and mental development
- The capacity for understanding, how children grow with age. The content of the study in any subject should be formed to suit their mental ability.

(b) *According to the specific interests of students:*
- Children will be able to learn better in fields where they have special tastes and inclination of the mind.
- It is also found that at different stages of age groups, children have different interest patterns.
- Interests of children also change according to circumstances and situations.
- Therefore learning experiences should be designed to suit the interests and tastes of the age group of students.

(c) *The curriculum should be environmentally centered:*
- The content of the learning experiences for children should be linked with the needs of the environment in which they live.
- For example, children from rural areas can understand and grasp easily the information which is directly concerned with their experiences in their own rural environment.
- The same thing applies to children in a various environments like urban areas, hilly areas, *etc.*

(d) *The principle of the comprehensive curriculum:*
- The curriculum must have the necessary details. List of topics to be covered does not solve the purpose.
- Both teachers and students should know clearly what is expected of them, what is the beginning and what is the end of the topic for the particular class.
- Material, aids, activities, life situations, *etc.*, should be listed in the curriculum.
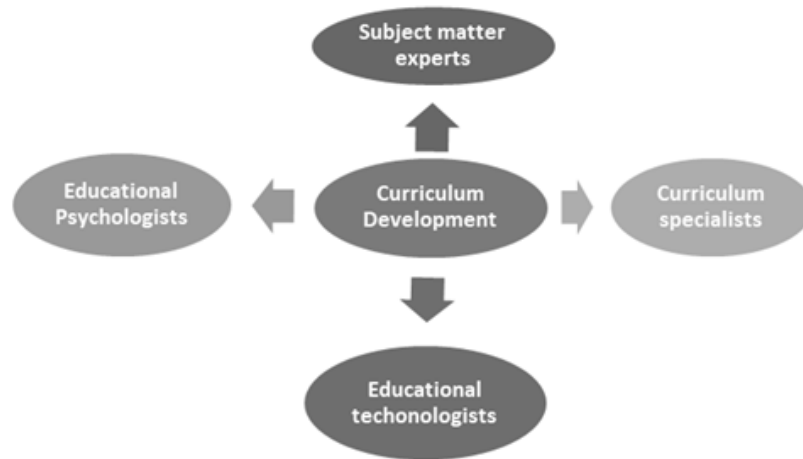
(e) *Principle of co-relation:*
- The curriculum should be such that all the subjects are correlated with each other.
- While designing the curriculum, it must be kept in mind that the subject matter of various subjects has some relation to each other so that they help the child eventually.

(f) *The principle of practical work:*
- Children are very active by nature.
- They like new things and can learn more by doing or by activity method.
- Therefore curriculum should be designed in such a way that it provides maximum opportunity to the child for practical work with the help of concrete things.

(g) *Principle of flexibility:*
- Instead of being rigid curriculum should show the sign of flexibility.
- The organization of the curriculum should be on the basis of individual differences as every child is different from the other.
- Apart from these conditions of society go on changing, therefore, the curriculum must be flexible enough to address the needs as aspirations of the society.

(h) *Principle of forward-looking:*
  • This principle asks for the inclusion of those topics, content and learning experiences that may prove helpful to the students in leading their future life in a proper way.
(i) *The principle of consultation with teachers:*
  • Teachers play a key role in the implementation of the school curriculum of any grade or stage.
  • It is therefore quite essential to seek the proper involvement of the teachers in the construction and development of the school curriculum.
(j) *The principle of the joint venture:* It is necessarily a joint venture where various experts are involved like educational psychologists, educational technologists, curriculum specialists, evaluation specialists, teachers, subject matter experts, *etc.*
(k) *The principle of availability of time and other resources:* Curriculum is the means to realize the outcomes of the educational objectives of the school. Implementation of the curriculum is equally important as curriculum construction. While developing curriculum experts should also keep its implementation in mind. They should be aware of the conditions of the schools and possible availability of time and resources available.

CURRICULUM DETERMINANTS

The curriculum determinants used in formulating the conceptual framework for this proposed programme are as follows: 1) The Learner, 2) Society and Culture (including organizational theory and leadership), 3) Knowledge (theories and structure), and 4) Theories, Research, and Practice in Curriculum and Instruction, and 5) Qualitative and quantitative research. The emphasis in this

programme is on the use of the determinants in planning, implementing, and evaluating programmes in elementary/secondary schools. The programme is field-oriented and focuses upon providing graduates with expertise to provide creative leadership in a variety of settings. Students in the B. Ed. Programme are expected to complete professional internships in educational institutions prior to the completion of the degree. The internships are intended to allow students to apply concepts and principles of curriculum within institutional settings. The B. Ed. Programme fulfills the certification requirements for curriculum-instructional specialists at the doctoral level.

MEANING AND CONCEPT OF CURRICULUM DEVELOPMENT

Curriculum development in its word meaning stands for the development of the curriculum. Rogers and Taylor: Curriculum development describes all the ways in which teaching or training organization plans and guides learning. This learning can take place in groups or with individual learners. It can take place inside or outside the classroom. It can take place in an institutional setting like school, college, training center, or in a village or a field. It is central to the teaching-learning process.

Curriculum development is a process involving activities like:
- Conceptualizing the curriculum,
- Selecting and organizing the content, material and learning experiences
- Suggesting the method and ways of providing these experiences
- Evaluating the learning outcomes in terms of attainment of desired educational objectives.

In simple words, *A curriculum refers to a defined and prescribed course of studies, which students must fulfill in order to pass a certain level of education.* Some influential definitions combining various elements to describe curriculum are as follows:
- *John Kerr:* According to John Kerr, a curriculum is planned and guided by the school, whether it is carried on in groups, individually inside or outside the school.
- The curriculum is a total learning experience provided by the school. It includes the content of courses (the syllabus), the method employed (strategies) and other aspects like norms and values, which relate to the way schools are organized.
- Thus a curriculum is neither development nor a sequence of experiences. It is a plan for facilitating learning for students.
- This plan starts with where the child is. It enumerates all the aspects and dimensions of learning that are considered necessary. It gives a reason why such learning is considered necessary and what educational aims it would serve.

In a nutshell,
- The curriculum is a means followed by the teachers and students for achieving the set goals and the aims or objectives of education being provided in the school.

- Curriculum, in every sense, is supposed to be used for all experiences. These may be curricular or co-curricular, imparted by the school for the realization of the stipulated aims and objectives of the school education.

Need and Importance of Curriculum Development (or Construction)

- Curriculum development is a purposeful activity.
- It is undertaken to design or redesign for the realization of certain specific educational objectives.
- The curriculum is the heart of the student's college/school experience.
- The curriculum should be reviewed and revised on a regular basis so that it is able to serve the changing needs of both students and society.
- The following points iterate the needs and importance of curriculum development.

Clear purpose and goals:- Curriculum construction provide written curricular goals which are nothing but intended student development outcomes. These goals and objectives are specified in considerable detail and in behavioural language.

Continuous assessment and improvement of quality:- Valid and reliable assessment of the curriculum is necessary. The curriculum followed by an institution should be reviewed regularly in order to maintain it's effectiveness in regards to the changing needs of the society as a whole.

A rational sequence:- In a curriculum educational activities are carefully ordered in a developmental sequence. This developmental sequence helps to form a well planned (or coherent)curriculum based on intended goals and outcomes of the curriculum and its constituent courses.

Making strategy in teaching and learning:- Curriculum development helps in suggesting suitable teaching-learning strategies, teaching methods, instructional materials, *etc.* It helps in providing for the proper implementation of the curriculum on the part of teachers and learners.

Helps in the selection of learning experiences:- Curriculum development is needed for appropriate selection and organization of learning experiences. It helps in the selection of study matter and other activities so that learners are able to acquire goals and objectives of teaching.

The process of curriculum development is needed for conceptualizing a curriculum in terms of the determination of educational objectives for teaching-learning at a particular grade of school education.

Helps in continuous and comprehensive education:- Curriculum development considers the need of providing a scheme of education for CCE of the teaching-learning outcomes. With proper feedback, it helps to bring necessary improvement in the teaching-learning process and environment.

STRATEGY IN CURRICULUM DEVELOPMENT

Similar to strategic management of organizations, curriculum development involves a process of defining directions and decision making about how these

directions can be realized. Mintzberg describes strategy as a pattern of actions that are consistent over time that may or may not be preceded by decisions. The term strategy is used to describe either an intention that is formulated intentionally (deliberate strategy) or an outcome that forms and becomes apparent organically (emergent strategy). Purely deliberate strategy precludes learning once the strategy is formulated, whereas emergent strategy fosters learning. Thought and action are often not separated in time, and strategies can emerge from feedback as action informs thought through learning. In practice, all strategy making involves some degree of deliberation and emergence so that flexibility and learning are coupled with some control.

Traditional planning in health professional faculty development tends towards deliberate strategy, focusing on the programme meeting the needs of individuals within a context. Strategy is outlined and implemented to achieve certain outcomes with little adjustment once initiated. Deliberate efforts to identify emergent needs of individuals and their context in order to adapt curricular position or perspective are rarely described. Strategic visioning is a deliberate process that addresses the philosophy and goals of a programme. Once a programme is underway, emergent processes can be encouraged if feedback is provided to inform and instruct. These could include strategic venturing in the development of new content, methods, or innovations and strategic learning from the emergence of new paradigms, philosophies, or goals.

An umbrella strategy is a mixed approach that encourages emergence within certain boundaries. Such a blend is useful in situations that require great expertise as well as creativity so that implementers are also designers who can use their knowledge of the situation at hand and their technical expertise to adapt the programme in progress. General guidelines or boundaries for direction, which are broad in outline and not specific in detail, are defined. These boundaries are usually defined within a strategic vision that is flexible in scope so that venturing and learning can occur. This intentionally creates conditions under which input, learning, and experimentation can facilitate and inform adaptation of the execution (content and methods) as well as the vision (goals and philosophy) of the strategy. Applied to curriculum design, this approach suggests that curricula need to have clear goals, intentions, and limits defined at the outset, but that conditions must be created to allow grassroots input, learning, and experimentation. Such a process should identify emergent needs and adapt in real time to respond to these issues. This approach enables innovation and organizational learning. Its use has not been described in the faculty development field.

5:04:3 BACKGROUND INFORMATION

In this article, I describe how an umbrella strategy informed the relevant, timely, and continuous evolution of the University of Toronto 2004-2006 Education Scholars Programme (ESP). The ESP was created in response to a perceived need to address the neglect of education and the advancement of

educators in our research-intensive university. Its development was itself part of a strategic plan for a central and coordinated programme of faculty development. The ESP is a two-year, half-day-per-week faculty development programme for 15 health professions educators of mixed professional backgrounds from the Faculty of Medicine (FoM) that enrolls a new class biannually. The FoM has more than 5,000 full- and part-time faculty members spanning 13 fully affiliated and 13 partially affiliated hospitals in the University of Toronto FoM. Candidates were nominated by their department chairs and selected by a selection committee consisting of the leadership of the ESP and the Centre for Faculty Development. Departments supported participation by providing protected time and tuition support for participants. The umbrella strategy illuminated the development of a strategic process of continuous and iterative feedback that informed curricular evolution in real time. Specific methods were implemented to enable enrolled participants, as they became increasingly aware of and able to articulate their needs, to inform curriculum development by participating in an ongoing feedback process. Using such a strategy in the design of faculty development and continuing medical education programmes not only enhances individual and contextual relevance but also participants' motivation, learning, and self-direction.

Fifteen multiprofessional participants enrolled in the first class of the programme in 2004, representing eight clinical departments (six MD, two other health professions). These eight men and seven women had been on faculty for an average of 5.6 years (range: 1-19). Their ranks included seven lecturers and eight assistant professors. Scholars attended 87.54% of all classes during the two years and, according to evaluation data, were extremely satisfied with the programme. During the two years of the programme, the semiannual programme evaluations yielded a 4.3 (1 = strongly disagree; 5 = strongly agree) rating of whether the individual sessions should be repeated for the next cohort (range of average score for each class: 3.6-4.9). Detailed programme evaluation findings will be reported in another paper.

INFORMING THE CURRICULUM

In this section, I describe how the umbrella strategy specifically informed the selection of various processes that were used initially or iteratively throughout the ESP to identify emergent needs and perspectives. A broad-based needs assessment at baseline informed the development of the goals for the programme, and these goals became the broad vision and boundaries. Subsequent to this, a variety of methods were implemented to solicit input iteratively from participants in order to identify emergent needs, learn, and experiment with evolving the curriculum in a timely way.

CREATING THE VISION: THE UMBRELLA

In the six months before curriculum implementation, the needs assessment incorporated an environmental scan internally and externally, including review

of multiple sources of information as well as interviews with key potential stakeholders and opinion leaders both within and outside the University of Toronto. The intention of the needs assessment was to identify perceived needs of local leadership and potential participants, understand barriers and enablers of the context, extract best practices, clarify information, and identify key forces and trends. For internal and external data sources.

Accepted applicants were interviewed by the course leadership to discuss their goals and expected outcomes for the programme, and their application materials were reviewed to extract redundant themes. Interviews of sponsoring chairpersons and clinical chiefs focused on the faculty development needs of their departments as well as their goals and expectations for the sponsored scholar. External experts were contacted to discuss their opinions on best practices and to answer questions about unique features and strengths of their programmes, as well as challenges and barriers to implementation and sustainability. All interviews were manually transcribed by the course director, and predominant themes were summarized at the end of the interview for review by interviewees to ensure accurate representation of their views.

Similar to other scholar programmes, the need to promote the professional development of educators in the health professions in the areas of teaching, education scholarship, and leadership was a priority need of all formal and informal sources. A recurrent theme in local leadership interviews was the expectation for participants to be able to provide faculty development in education to their peers through such activities as programme development, peer review, and consultations.

Additionally, the development of a community of practice of educators emerged as essential to sustaining these geographically distributed participants beyond the duration of the programme as well as to promote inter- and intraprofessional collaboration. With such an enormous and distributed faculty, this demand for participants to disseminate what they are learning and to collaborate was not surprising.

The ESP vision/programme goals were threefold: to develop (1) scholarly health professional educators with enhanced abilities in teaching, education scholarship and education leadership, (2) faculty developers, and (3) a community of practice.

A core curriculum was defined that provided exposure to key constructs in teaching, education scholarship, and leadership that would span the program's two years. Contributing course activities and requirements were designed to facilitate the integration and application of these constructs into the actual practice contexts of participants. Teaching practica, lectures, workshops, and scholarly project assignments provided scholars with the opportunity to integrate and apply what they were learning in the classes. Apprentice, lecture, project, and reflection discussions as well as written apprentice reports supported the development of faculty development skills, including small-group facilitation and oral and written feedback. In reflection discussions, participants learned to

reflect on and deconstruct issues and assumptions in their practices as educators. Dossier and career action plans assisted participants in defining career and leadership goals and plans to achieve them. Hot topics classes focused on critical appraisal of selected hot literature with an emphasis on discussion of application to practice.

At the outset of implementation, the first-term curriculum was defined and a working draft of the second term was in development. The plan was to leave up to half of the topics in the second year for emergent needs that evolved from the first year of the programme. By identifying core curriculum goals while reserving curricular space for identifying and addressing emergent needs, we successfully applied the umbrella approach to curriculum planning.

METHODS TO ENABLE EMERGENCE

To avoid the traditional time lag between identifying emergent issues and incorporating them into curricula, we developed a number of strategies to solicit input from participants during the two years of the programme. These methods were selected on the basis of their practicality, availability, and minimal added burden to the participants and administrators of the course. Students were advised at the outset that in keeping with a learner-centred collaborative programme, the course was prepared to evolve the content and process in response to emergent needs.

They were, therefore, encouraged to provide feedback on any issues or needs as they arose. It was apparent that they were pleased with their potential to influence the course design.

CREATING A DIALOGUE SPACE

Flexibility is not possible without formal structured curriculum time allocated to dialogue about emerging needs. Therefore, a number of spaces were built into curriculum time for discussion of course issues and participant needs. A half hour of class time weekly was devoted to housekeeping discussions. Both the course director and participants were invited to raise any questions, issues, or business related to the programme content, process, and administration and potential responses to the issues.

Participants were also invited to meet with or e-mail course leadership outside class time. Participants kept journals on their educator practices throughout the course and brought them to the 12, one-hour classroom reflection discussions.

These discussions provided further opportunity to identify shared needs. Participants also raised questions and issues for further learning in the apprentice discussions that followed every class.

These discussions involved deconstructing the curriculum design and teaching methods of the preceding class with the intention of critically reflecting on the process as well as crafting a formative feedback report for the faculty member. The course director kept a journal on the course to keep track of emergent issues and themes.

CLASS AND PROGRAMME EVALUATIONS

In addition, weekly class evaluations solicited information about what could be improved and allowed participants to submit general comments. These evaluations were synthesized and reviewed weekly so that any questions about the results could be discussed in housekeeping time with the class. Semiannual programme evaluations inquired about what could be improved and what was missing from the programme. Any unclear findings were discussed with the class at the beginning of the following term.

REFLECTION PAPERS

At the end of each term in the first year, students prepared reflection papers that addressed how they were applying the course in their practice. These reflection papers provided course leadership with a window into the challenges and contexts in which participants were translating their knowledge to practice.

OPINION LEADER INTERVIEWS

The course director met annually with key formal and informal local opinion leaders in health professional education to scan for local preoccupations, driving forces, and trends that they felt should inform the course curriculum.

THE CURRICULUM FLEXIBILITY AND ASSESSMENT

Culture themes relate to the Learning content. Leadership and Teacher skills fall under the theme Agents. Finally, Reliability and Appropriation of available tools refer to aspects of the technology. In summary, the contextual factors quite well to the mediating circumstances categorised in the Generative Framework. One development to emerge is to distinguish the Generative Framework heading"Context? into two themes: the Environment and Learning Content.

FRAMEWORK OF CONTEXTS

The framework places the learner clearly at the centre, with three elements of context distinguished: Knowledge, Resources, and Environment. The framework highlights how these elements interact but importantly how they are "filtered? or mediated by certain factors. For example, the ability to count is named as a form of knowledge, and the curriculum as a knowledge filter - a factor mediating the learner's access to this knowledge. The structure of different social relationships is an example of how certain (human) resources may be filtered.

The framework is used in the next section to discuss the different factors mediating the adoption of technologies in the Capital research.

Contextual theme Key mediating factors identified as:
- *Environment Home*: School setting
- Learning Spaces

- Learning Content Curriculum Flexibility
- Assessment Culture
- Agents Leadership
- Teacher skills/confidence
- Tools Reliability
- Appropriation of available tools

ENVIRONMENT

He environments created by the interplay between the locations, the technologies, the cultures and the agents raise new issues and opportunities in TEL. New technologies are being employed to support learning within and across many different environments from the campus to museums and art galleries, to field trips, to workplaces and to homes. Indeed, technologies have the potential to change the nature of learning in the classroom and, as reported in the Yewlands Technology College Case Study, can help the entire campus to be viewed as a space (or a series of spaces) for learning. In some cases technology may enhance traditional undertakings such as collecting samples and artifacts' and taking notes on a school-trip for discussion on return to class. Increasingly, however, technologies can facilitate activities which would not previously have been possible - the use of location based devices or the use of a platform to share and access data from anywhere at any time (such as the city- wide Bristol Eat-a-meter project,) or simply to capture images and audio.

HOME - SCHOOL SETTING

There has been a considerable drive towards increasing learners? access to their learning from home. In parallel there has also been a drive to increase parental access to their children's schooled learning. Although clearly aimed at maximising opportunities, this has been as the means to monitor pupils? progress rather than to instigate or enhance the conversation about learning (although the two are neither synonymous nor mutually exclusive).

Internet provision in itself does not lead to enhanced conversations about learning and there are significant disparities between schools with regards to making learning content available, accessible and current. For some learners, particularly those with disruptive domestic circumstances, the home is not necessarily the best place for out of school learning and alternative provision is necessary. Previous research into (non-ICT facilitated) parental involvement in homework has also reported that disadvantaged parents can engage less in supporting their children than the better-off. However, the example of Shireland Gateway illustrate that where a coherent strategy is implemented the conversations between parent/career and child and parent/carer and school can be enhanced. For families without home access, schools might consider approaches where access is provided in community centres, mosques and supermarkets. Teachers and practitioners generally seem to be strongly 35 persuaded by the research which suggested that "good Internet and computer

facilities add one more GCSE grade to any pupil?. There is significant enthusiasm for the acceptance, and integration, of learners? own devices on and off-campus. In the HE sector this is now commonplace but schools remain generally far more cautious (Phillips, 2010b). The benefits in terms of ease of use and sustainability are widely accepted. However, there are clear technical implications and in some cases learners may be reluctant to use their own devices for learning activities (they may not wish to have video of themselves performing Shakespeare or a dance routine on another pupil's phone, nor to use their own device for filming another pupil). Whether the user owned devices in question are PCs, notebooks, handhelds or phones, there will be questions of parity of experience.

LEARNING SPACES

The design of learning spaces can hinder or facilitate the pedagogical approach adopted and hence the way in which technology is used to support this. The move to change spaces partly reflects recognition of the need to move away from the traditional didactic model, however there appears to remain two typical set ups: rooms with no technology except a couple of PCs or ICT suites with rows of PCs. In the first type of room, there is little opportunity for the integration of technology.

In the second, there is little opportunity for the integration of innovative pedagogy, such as collaboration and conversation. Both can inhibit innovative teaching and learning. A third familiar set-up, laptops on a trolley, can alleviate this stark contrast, but the time needed to book these out and set them up acts as a disincentive for many teachers. The deployment of smaller devices and careful positioning of kit - so that the technology is unobtrusive but always available - can open up spaces for learning in new ways.

Technologies can also help to create flexible and/or collaborative new spaces where new builds are planned. Consideration does need to be made though of practicalities of employing different devices - such as cables needed for power. A number of independent studies have been carried out in the UK into the effects of technologies on attainment in selected subjects. Whilst the remit of this research did not extend to investigating virtual learning spaces, it is clear that these have the potential to bring another dimension to the learning experience - either in tandem with the increasing range of physical learning spaces we have noted or with the likely growth of the "virtual campus? model.

LEARNING CONTENT

Curriculum Flexibility

A significant challenge in adopting new technologies is to understand how their use maps onto curriculum. With a more rigid curriculum and timetabling for its delivery, this may be difficult as it can be impractical to introduce a novel tool simply to address particular domainspecific content within a particular short period of time. The growing interest in new curricula such as the RSAs Opening Minds,

Futurelab?s Enquiring Minds or the Australian New Basics has been inspired by the view that the traditional curriculum neither prepares students appropriately for the world of post-compulsory education nor takes account of their current non-school experiences.

Our action research with schools using such curricula indicated great promise for how technologies can be integrated into more flexible "rich tasks?. A difficulty, however, was separating how the increased use of technology reflected the curriculum per se or the resultant change in pedagogy - the two are clearly interlinked. Furthermore, whilst there remains a firm belief in the potential of technologies, perhaps the necessity to support curricular developments there are also concerns about introducing another dynamic into an already ambitious attempt to transform pedagogy. This concern which was voiced by some in the deployment of the"learning platform? and/or CPD issues may indicate the difficulties in translating innovation into whole-school change.

ASSESSMENT CULTURE

A clear theme to emerge from our investigations into the adoption of e-assessment was the dominant effect of summative assessments. Assessment scores can determine the future opportunities of learners and institutions, so shaping teaching practice. Consequently, if a tool does not directly benefit such performance measures, there is a danger that is it not seen as cost effective. This notion was voiced during our investigation of tools to support higher order thinking as well as our focus on social learning tools. It was reported that a key barrier was encountered when these tools did not map to particular skills measured through assessment.

Implicit to this argument is how assessment can hinder the adoption of new curricula that focus on a wider range of skills: Since curriculum and assessment are inter-twined, then innovations in curriculum (such as "rich task? learning through cross-disciplinary projects) need to be accompanied by new forms of assessment that can capture the richness of learning across times and settings then package it in a way that can offer both evidence of achievement and a source for reflection."

Designing technologies to meet assessment requirements is clearly a challenge therefore, although our work identified successful attempts to do so, such as the Bowland Maths Materials. It is also important to emphasize here that whilst summative assessment pressures may represent a significant barrier, tools to support formative assessment offer great potential. Indeed, a commitment to formative assessment was perceived as a key enabler in the successful use of e-portfolios in the e-Scope project.

LEADERSHIP

To the national policy-maker, bottom-up often meant from the "institution? and top-down meant government and its agencies (including local authorities). To the practitioner bottom-up meant the classroom practitioner and top-down

often meant the senior management team. Leadership is a key influencing factor in the successful take-up and use of technologies within teaching and learning, the importance of leaders encouraging ownership through openness and trust which was manifested in a whole-school consultative approach to the new technology and allowing staff to take risks with the technology without fear of failure or ridicule.

Another facet of the school's strategy was the introduction of new contractual terms and conditions which make clear reference to daily use of, and familiarity with, technology. The leadership at this school provided support when staff faced practical challenges - such as the failure of technology to live up to expectations - but also established "mechanisms for support?, such as the provision of a dedicated ICT technician. Leadership commitment extends beyond CPD and technology implementation - one interviewee responsible for a new college rebuild commented that culture and leadership buy-in is also vital to the success of innovative learning spaces.

Leadership is therefore a key factor in the successful uptake of technologies, however, some interviewees pointed out that it was not necessary for leaders to do everything. Rather their strength was to"...empower others to move the learner journey forwards and to facilitate good practice through ensuring robust processes and procedures are in place". Leadership, also has a highly influential role in providing the appropriate training for teachers as well as engendering confidence, issues discussed in the following section.

TEACHER SKILLS, CONFIDENCE AND ATTITUDES TO INNOVATION

One of the most persistent issues encountered during our research has been the ongoing challenge of professional development. Innovation can vary according to context and there is a need to acknowledge this rather than attempting to define a crude benchmark. Contributors at the Innovation Forums also noted the need to provide time for practitioners to investigate and"play with? new technologies; to build the confidence needed to take risks and to be prepared to admit any lack of knowledge.

Indeed, some teachers still see technologies as making their professional lives more difficult and specifically some perceive mobile learning as eroding their authority. Some staff involved in the Royal Veterinary College project did not see mobile phones as appropriate for learning believing that they were more suitable for texting and playing games - they also felt that parents shared this view. There were fears about student's videoing lessons and posting these to YouTube. Therefore, a significant challenge to adoption reflects the attitudes of teachers towards technologies. There is a perceived generational divide in the teaching profession although this is much more complex than often portrayed. Younger teachers may be less fearful of new technologies but that confidence does not automatically translate into classroom practice. We also found some suggestion that (older) teachers with teenage children were quite comfortable

with new technologies since they were familiar with these from their home Environment. The above reflections should not imply negativity or pessimism.

It is clear that there are numerous examples of "innovation? across all sectors of education. Many teachers then are obviously managing their risks as they investigate new technologies. The value of one-to one support is recognized and appreciated but there are fears about what happens when this person moves on, and they are invariably in demand. However, Yew lands used the role as a catalyst and seem to have handled the transition to "innovation? becoming embedded (albeit within a small group and sustainable.

Informal peer support networks are seen by practitioners as valuable although the actual benefit is hard to substantiate. Consideration that CPD strategies are context specific is also an important factor. It is crucial is for institutional leaders to create and maintain a supportive learning environment for teaching staff.. Currently, there is a role for Local Authorities or other bodies (including perhaps industry) to support where wider dissemination and adoption is actively sought.. It is unclear how this will evolve in the more devolved landscape we may observe in the near term.

TOOLS RELIABILITY

Research explores that whether considering e-assessment, mobile learning, cross contextual learning or CPD, a persistent theme is the reliability and predictability of the Technology infrastructure. Somewhat surprisingly perhaps, some teachers and institutions also feel inhibited by existing pupil-to-device ratios, which remain far from one-to-one. Even today the quality of the technical infrastructure varies greatly from institution to institution. In some cases the pressure for more devices and a higher functioning infrastructure is a consequence of wide-scale innovation within the institution, whereas in others it may be due to insufficient or injudicious investment.

Since we are unlikely to see again (in the near future at least) investment in technology on the scale of recent years there is a pressing need to reconfigure technical support services, exploit new technological paradigms such as cloud computing and thin client solutions and/or encourage the integration of user-owned devices on the institutional network - on and off campus. However, each of these brings with it new considerations - key amongst these is the need for technical staff to have access to ongoing, high-quality professional development opportunities.

Two interviewees from different backgrounds and perspectives observed that the average Building Schools for the Future secondary school has a far more complex IT infrastructure than 90% of businesses in the UK. Whilst many schools are yet to benefit from BSF, and we note the disparities, many have also had significant investment in their technology infrastructure. This would seem to imply that there is the potential for some students to experience a technology rich learning environment which may well be the equal of, or better than, that they will experience in employment, Further or Higher Education.

However, our interviewees reported that, by comparison with businesses, schools investment to support the infrastructure is typically low. Just as the prospect of sudden increases in capital investment catalysed leaders to look at the Total Cost of Ownership (TCO) of their technologies and to establish appropriate technical support structures then the need to maximise reduced capital (perhaps through a move to user owned or hired devices, cloud computing, *etc.*) and to exploit the existing investment should inspire a similar review. The potential to reconfigure support in order to improve the curriculum experience is illustrated in the Wickersley Case Study (Ugochukwu, 2010) which investigated the implementation of the Framework for IT Support (FITS).

The application of FITS processes has the potential to free up resource to support curriculum innovation and can lead to improved relationships between staff and between staff and students.

APPROPRIATION OF AVAILABLE TOOLS FOR EDUCATION USE

Probes on Action Research Projects and Case Studies it is found that schools were sometimes inhibited by their use of tools which were not designed specifically to meet their needs. Djanogly City Academy was keen to exploit the social tools which students used outside of school. However, the tools they wished to use such as Face book were deemed inappropriate within the school environment in terms of pupil safety and network security - and in the ability to track students? work. Djaongly to develop a bespoke platform have proved somewhat frustrating.

The school also point out that they have invested significant resources - something which may well prove prohibitive for most institutions and indeed is increasingly unlikely in the current financial climate.

Whilst investigating the potential of technology to support higher order thinking skills, an interviewee suggested that an important issue was the way in which some tools actually constrain higher order thinking by being too specific thus reducing the ability for the teacher to "take ownership? and adapt them for a particular context.

At Yew lands Technology College where the teachers had used gaming devices initially with "gaming? in mind but had rapidly found these tools to have other applications we observed that: "Once familiar with the devices in an educational setting the staff began to push the boundaries of use. Whilst this was a very positive outcome, it became clear that they were using the technology in ways for which it was not designed.

As a consequence, even the manufacturers were behind the curve and sometimes unable to respond quickly to requests for development." (Phillips, 2010b) However, the fact that the ability of these tools to enhance the learning experience has been recognised by the teachers concerned (by no means all of whom are "evangelists?) and that they continue to find fruitful new ways in which these and other tools can support their pedagogies would seem to suggest that there is significant potential.

ISSUES RELATED TO CURRICULUM APPROACHES

Education in South Africa is facing great curriculum-related challenges. Teachers are principal role-players in the process of meeting these challenges. The questions remain whether they do indeed participate fully, or are even allowed to participate in the process, and if they do participate, what is the nature of their involvement?

Within the present context and development in which stringent demands are made on teachers, and change in the educational arena has not yet stabilised, it is imperative that there should be dialogue about what is expected of teachers when it is suggested that they should be "more involved in curriculum development" or rather that their "voice" must be accommodated. In this paper a theoretical underpinning is provided for the concept teacher involvement in curriculum development. The theoretical underpinning will be based on the most recent literature regarding the role and function of the teacher in curriculum development.

It is however necessary to investigate to what extent this phenomenon of teacher involvement are actually accommodated in actual practice. In the second section of the paper the focus will be on data generated during a recent research project in a South African context regarding teacher involvement in current curriculum changes. This data will highlight teachers' perceptions and the nature of their involvement. In the final instance it provides evidence on the actual involvement and to what extent teachers' "voices" are indeed accommodated and included when curriculum decisions are made.

It can only be concluded that what one finds in the literature and what happens in the curriculum practice, are often worlds apart and that the "voice" of the teacher is to a large extent ignored or not heard. And this will have a major impact on the effectiveness of learning!

There are several views of curriculum that often encounter. One is that teachers, especially elementary teachers, are so under-prepared in mathematics that the curriculum must do everything for them. It must tell them exactly what to do, when to do it, and in what order. Once this was called "teacher-proof" curriculum. Now, of course, that term is no longer fashionable, so teacher-proof-ness, when it is espoused at all, is couched in other terms. For example, a textbook representative recently described to me the lessons in their teacher's guide by saying, "And it's all scripted for the teacher, so that they know what questions to ask." This view of curriculum assumes that there is a Right Way to organize and teach the curriculum, and that, if we have a curriculum that embodies this right way, students will learn mathematics well.

Another view holds that it is only the teacher who knows her students' learning needs well enough to continually modify the classroom environment in response to those needs. Therefore, the teacher must develop her/his own curriculum. Sometimes this view admits that, because teachers are not *yet* adequately prepared to teach mathematics, we may need innovative curricula now —

temporarily —*until* we have accomplished the job of large-scale teacher development. This is the view of curriculum as a necessary evil — we don't want it, but we can't yet do without it.

A third view, somewhere between these two, is that of curriculum as reference material. The argument goes something like this. Teachers don't have the time or energy to develop all the curricula for all the subjects they teach. Therefore, they need good reference materials from which they can put together a curriculum of their own. This allows teachers to be creative and to become acquainted with new ideas. The curriculum is a reference library in which teachers browse.

We disagree with all of these positions. Or, perhaps, since all of these have probably been somewhat unjustly characterized, it is more accurate to say that we are trying to find some new ways to articulate what curriculum contributes to the learning and teaching of mathematics. This new articulation is possible, and necessary, because new curricula that are currently being developed are quite different from our traditional notion of what a curriculum is and make possible a different kind of partnership between teacher and curriculum materials.

Perhaps we have been without "good" curricula for so long that we have very low expectations about what curriculum materials can provide. We are used to thinking of a curriculum as something that robs the teacher of her professional judgment and/or does not model mathematical thinking and reasoning as promoted in the NCTM Standards. We would like to put forth a new view of what curriculum can be. We believe that curriculum materials, when developed through careful, extended work with diverse students and teachers, when based on sound mathematics and on what we know about how people learn mathematics, are a tool that allows the teacher to do her best work with students. As these new curricula begin to appear, we need new ways to think about the role of curriculum.

We see the best mathematics teaching environment as a partnership between teacher and curriculum. Both teacher and curriculum bring important contributions to this partnership that the other cannot do well. It is not possible for most teachers to write a complete, coherent, mathematically-sound curriculum. It is not insulting to teachers as professionals to admit this. Curriculum development, like teaching mathematics, is a job that requires people and resources; it requires a skilled team of mathematics educators spending many thousands of hours writing, thinking, working in classrooms, and listening to students and teachers. We do not sell teachers short by recognizing that they cannot do this job.

But only the teacher is there in the classroom, observing and trying to understand her students' mathematical thinking. Individual teachers must continually assess and modify their mathematics programme for their own classroom. Thus, curriculum is not a recipe or a compendium of what "should" be taught at a particular grade level. Rather, it provides both a coherent mathematics programme for students, based on the best thinking available in the field, and material that supports teachers in making better, more thoughtful,

more informed decisions about their students' mathematics learning. The link between curriculum and teacher decision-making is a focus on mathematical reasoning. Neither curriculum nor teacher can fully anticipate the complex and idiosyncratic nature of the mathematical thinking that might go on among thirty students in a single classroom during any one mathematics class. However, both teacher and curriculum contribute to a repertoire of knowledge about student thinking that leads to better mathematics teaching and learning.

How does this work? Each curriculum unit presents a few, related significant mathematical ideas. The curriculum provides four types of information about these ideas: a series of activities for students, explication of aspects of the mathematics content, discussion of students' mathematical thinking in the context of this particular content, and pointers towards issues of pedagogy that arise as students engage with the content. Only the first of these is something provided directly for students; much of what the curriculum provides is for teachers. Curriculum is, in fact, primarily a tool for teacher development. This is a radically different conception of curriculum; it is one that makes it possible for teachers to truly be in partnership with the curriculum rather than simply using it as a guide for sequencing student work.

In order for this partnership to work, curriculum must do its job. What it provides for students is important, but what it provides to support teachers is equally important. Curriculum can only support teachers honestly if it has been developed through intense partnerships with teachers and students. In this kind of development work, curriculum authors are in classrooms *frequently*, each part of the curriculum is thoroughly field-tested in diverse classrooms, and field data are carefully reviewed to inform revision of the materials. This kind of development process results not only in good investigations for the range of students, but also in a wealth of information about how students approach those investigations, what mathematical issues are central to their understanding, what pragmatic and pedagogical issues arise for the teacher, and ways in which teachers can modify and/or extend the investigations to suit their individual class. The curriculum materials must then be designed so that this information is available to the teacher. Let me give an example from a recent episode in a field test classroom of how this works. (Teachers quoted in this essay are participants in an NSF-funded project, Teaching to the Big Ideas, a joint project of EDC, TERC, and Summer math for Teachers at Mt. Holyoke College. Pseudonyms are used.)

Meg, a second-grade field test teacher, is using an activity called "Enough for the Class," in which students consider whether the number of cubes in a bag is enough for each student in the class to have one. If it's not, how many more are needed? If it is, are there extras? Meg thinks of this problem as a subtraction situation and assumes that her students will do something like the following sequence of steps: 1) find out how many cubes are in the bag; 2) remove the number of cubes equal to the number of students in the class; 3) figure out or count how many cubes remain. One day she gives them the following problem:

there are 16 blue cubes and 17 red cubes; are there enough for the class? Students quickly decide that there are enough for the class of 26 students and begin figuring out how many extra cubes there will be. Meg is taken by surprise when some of her students solve the problem this way: I can take 10 cubes from the 16 and 10 cubes from the 17, that makes 20. Then I need 6 more cubes, so I take away 6 from the 16. Now I have 26, enough for the class. That leaves just the 7 cubes from the 17, so there are 7 extra. Without ever finding the total, Meg's students have solved the problem. Meg wrote about this episode: "Many children actually did solve the problem the way I expected. Many didn't... They showed a lovely ability and willingness to take numbers apart and put numbers together. They... had made sense of what was being asked. But they still didn't figure out how many cubes there were in all! I am not sure what surprises me more — that so many children don't think explicitly about the whole or the total when solving these problems, or that it never occurred to me that they didn't have to."

This is exactly the kind of episode that finds its way into the curriculum itself. We may include a classroom dialogue, based on this episode, to provide teachers with illustrations of the kinds of issues that tend to come up as students talk about their approaches to a mathematical problem. In addition, we would include notes for the teacher about the mathematical issues raised in this episode, in this case, the relationship between addition and subtraction in the structure of this problem and how students' strategies are related to their understanding of the number system. Episodes like this one provide guidance and examples for teachers who may encounter similar mathematical issues in their classrooms. They alert teachers to important mathematical ideas they may have been unaware of, and they provide guidance about engaging students with these ideas. In many ways, each mathematics unit of study, then, becomes a minicourse for teachers about a particular domain of mathematics. As teachers use new curriculum units more than once, they can learn more mathematics and more about their students' mathematical thinking. What they learn from watching and listening to their students will illuminate what they read in the teacher book, while what they read there will alert them to how to better listen and watch. Curriculum must help the teacher assess her students' understanding throughout the year, provide models of mathematical talk that stimulates and supports student thinking, and offer ways for the teacher to learn more about the mathematics she is teaching.

We have often observed that — as part of the old view of curriculum as the RIGHT WAY — when something in a curriculum doesn't work, people consider the curriculum — or the students — to be flawed. Rather, *the curriculum itself must assume that what it suggests won't always work.* No matter how well curriculum materials are tested, no matter how many times they are revised, each school brings its own mix of resources and barriers, each classroom brings its own set of needs, styles, experiences, and interests on the part of both teacher and students, and each day in the classroom brings its own set of issues, catastrophes, and opportunities. We could test and revise endlessly; each

classroom test would result in new ideas we might incorporate and raise new questions about pedagogy or content. But at some point we have to decide that the curriculum materials themselves are *good enough*— ready for teachers to use and revise in their own classrooms. Teacher decision-making, therefore, is key, and the curriculum must be designed with this assumption in mind. The teacher's role is to connect the particulars of her classroom and students to the investigations presented by the curriculum.

Taking this role seriously involves making decisions about which mathematical ideas to pursue. Because there are so many connections within the domain of mathematics, issues often emerge from students' thinking that are different from what the teacher — or the curriculum — anticipated. The teacher must decide which mathematical ideas are important to pursue at this time with the whole class, which might be best to pursue with an individual student, and which to put aside. In the following episode, a fifth grade teacher is faced with a choice about whether to move away from the topic on which she expected to focus in order to deal with an unexpected issue that comes to her attention.

Kate watched her students play a number game which involved arranging digits to form 2-digit numbers with a sum as close to 100 as possible. This game was challenging for many of Kate's poorly prepared students. The game was part of a series of activities focused on developing knowledge about 100, its place in the number system, and its relationships to other numbers. Students scored each round by comparing their sum to 100: a sum lower than 100 was scored as a negative number; a sum higher than 100 resulted in a positive score (*e.g.*, 101 would result in a score of 1); and a sum of exactly 100 resulted in a score of 0. At the end of several rounds, students added their scores from all rounds; the closer their sum to 0, the better their score. Kate noticed that when students used a number line to compute their total score, they tended to skip zero. She wrote, "The score of 0, which usually meant nothing, was now the highest score... they decided that if 0 was actually the winning score, it was a pretty important number and really shouldn't be skipped. Usually when they had a score of 0 (for example on a spelling test), it wasn't great. So they had to rethink what 0 meant in this game while they played." As she watched her students, she realized that they were confused about the relationship among positive integers, zero, and negative integers. She devised a problem about owing money to support her students' explorations of these relationships. After some work on these problems, she asked her students to consider what +1 cent, 0 cents, and -1 cent might mean. They decided that +1 meant "a penny you could hold," that 0 meant no money and you don't owe anything, while -1 cents was "a cent that you owe." She concludes, "I'm not sure they understand this, and I hope to work on it some more... but it did raise a lot of issues." She lists questions she'd like to explore with her students: What is 0? How is 0 used in different ways? Are there numbers that are less than 0? How many numbers can there be that are less than 0?

CURRICULUM MATERIALS AS A TOOL
FOR TEACHER DEVELOPMENT

Decisions like Kate's are complex. Kate needs to consider what mathematics is important for her students, whether a digression from the ideas they are currently pursuing is warranted, and how to create a context and problems that are appropriate for her students. How can teachers like Kate be supported as they use good curriculum materials, try to understand student thinking, and design next steps? It is clear to all of us who have been involved in developing curriculum that any curriculum materials, no matter how well they can be used, can also be used badly and can be misunderstood and distorted. Teachers have not necessarily been prepared, in their own mathematics education, to focus on student thinking or to see their role as partners with the curriculum in the way that we have described this partnership here. The best use of good curriculum materials is in the context of a long-term staff development programme which engages teachers in ongoing reflection about students' mathematical thinking and continued work on mathematics content with their peers.

Professional development courses that use innovative curriculum materials as a core can be designed for both preserve and inservice teachers. For inservice work, this professional development/implementation might be composed of two elements: intensive components (*e.g.*, a two-week summer course, or several three-day sessions during the school year) and ongoing, long-term interaction (*e.g.*, a study group of grades 3-4 teachers within a school) that provides a continuing forum for thinking about mathematics content and about students' mathematical thinking. The ongoing school-based component provides the scheduled occasions and communication with peers to stimulate continued thinking and learning as well as help in grappling with the everyday, pragmatic concerns of implementation. However, it is critical that the design of these experiences does not focus on "how to do" the curriculum, but on the development of the teacher's professional expertise — increased experience with mathematics content and with understanding the development of mathematical understanding. This means that teacher leaders who act as facilitators for these ongoing groups need their own support and training so that they can help the teachers in their school or system focus on understanding children's mathematical thinking and developing approaches to best support and extend that thinking. The use of curriculum materials as a core for professional development provides a direct link between teacher enhancement and what actually happens in the classroom. Professional development of this sort has two advantages: (a) the teachers leave the professional development experience with a concrete unit (or units) of instruction — a way to begin implementing what they have learned, and (b) the materials themselves continue to provide information and support to teachers as they teach. They serve as a catalyst for engaging teachers in thinking about children's mathematical thinking — a way of continuing the professional development experience.

Another valuable tool to support this kind of staff development would be classroom episodes, written by teachers, about their own experiences as they used particular curriculum materials. These episodes would describe students' mathematical work, discuss issues about mathematics or children's mathematical thinking that were raised for the teacher by this work, and give examples of decisions made by the teacher based on her observations and reflections. Schifter (this volume) describes some ways that this can happen.

Elsewhere, we have posited that we can never prepare elementary teachers well enough before they enter the classroom: "In fact, it appears that the new mathematical understandings teachers must develop and the teaching situations they must negotiate are too varied, complex, and context-dependent to be anticipated in one or even several courses. Thus, teachers must become learners in their own classrooms." Teachers must continue to learn mathematics and to learn about students' mathematical thinking as they teach. Curriculum materials that are designed to support ongoing teacher development can be an important tool in this endeavour. As teachers teach a particular curriculum unit — or related units at different grade levels — they meet together regularly. Material for teachers in the curriculum becomes a focus for study and helps the teachers identify areas of mathematics about which they need to know more and questions about children's thinking they need to investigate. These efforts need to be supported by a good facilitator, which may be a teacher who has received special training, as well as writing by other teachers about mathematical issues they have faced in their own classrooms.

Meg and Kate are doing exactly what we want curriculum to orient teachers towards — reflecting on students' thinking, trying to understand it, and then planning the next step. This constant decision-making should be what we expect. It's not a matter of using curriculum or not using curriculum, but of intelligent teachers using intelligent curriculum intelligently.

5

The Curriculum Development Process

The following stages have to be followed while developing a new curriculum;

SITUATIONAL ANALYSIS

Some important facts and figures must be established first before developing the curriculum. This is done through baseline surveys/or Needs Assessment – e.g;

The potential trainees – (managers, staff, other users, their experiences and educational background).

INFRASTRUCTURE AT TELECENTERS

- Examples, statistics and activities of the Telecenters (existing Telecenter and existing curriculum)
- Relevancy of Telecenter to their communities
- Government policy on ICT; Non-Formal-Education, potential mentors, resource persons and/or counselors
- Accessibility to sources of energy (electricity)
- Participants to give more points on establishing the status quo
- Without a Situational Analysis you can not develop a good and realistic curriculum.

Information gathered should reveal the following:
- Community needs that can be addressed using Telecenter approach
- The strengths and challenges in the different curricular contexts *e.g.*, Economic, Social and Political contexts.
- The need for improvement on present curriculum or starting/developing a good curriculum

- The particular aspects to be reviewed/developed
- The feasibility and necessary resources available and what is needed
- The sources of the required resources and how much of it
- N.B Use the SWOT Analysis to analyse the information gathered

In summary, Situational Analysis involves:

- Identifying tasks and problems and seeking possible solutions.
- Identifying difficulties and possible areas of resistance
- Clues to planning for the resources and the organizational changes that will be required.

FORMULATING OBJECTIVES

Objectives:

- Are specific statements of purpose to suggest immediate results
- Are more specific than goals and the specificity is increased as one advances from programme objectives to a module and from a unit to lesson/lecture objectives.
- Are statements of purpose to help our planners develop purposeful instructional programmes
- Are a justification for the need of providing education and a slogan to solicit support for relevant education
- Help guide the educational process. You cannot decide what or how to teach, without knowing why you do it.
- Try to improve the practice of education by getting clarity about educational ends
- Are a test to be applied to the educational process giving a precise basis for evaluation and determining the degree to which the educational programme is useful.

Curriculum objectives of any programme, institution or education system constitute the behaviours which the learners have to show or exhibit if the aim of the course is attained *e.g.*, what skills they should possess, what knowledge and insights they should have, what attitudes and values they should develop. Objectives are derived from analysis of the situation. They have to reflect

- The needs of the society
- The needs of the teacher, instructor/programme manager
- The needs of the learner/users.

This is because curricula are prepared so that people may learn. What is learnt is utilized by the people in society. For example a product of a telecenter can use CDS, Videos to teach, sensitize and teach farmers on better methods of farming.

There are specific considerations we need to make when making objectives. These include:

- Educational philosophy (and other philosophies/vision)of a country
- Government education policy
- The level of development in the country

- The teaching force and its support systems
- The course or programme delivery systems
- The contemporary society
- International developments
- The target population
- National sets of values
- The evaluation methods
- Psychology –the way children and adults learn.

The objectives should be closely related to.

- The national education policy on ICT development, management what to teach and assessment of learning
- The different levels and types of educational programmes and what the ICT and the media can offer to managers and users.

Different themes to be covered in the Telecenter programme. Needs and aspirations of the community and the Telecenters *e.g.*, development, health, skills production and harmonious living.

N.B: The new trend now is to state the learning, outcome and the competences learners are supposed to exhibit by the end of the programme.

SELECTION OF CONTENT

Curriculum content is a body of facts, ideas, concepts and skills that are presented, discussed and involved in the course. The content selected should reflect the pre-determined curriculum objectives and experiences needed by the learner.

GUIDELINES FOR SELECTION

Prioritise: select what is basically needed in specific circumstances. It should therefore not be overcrowded.

Balance: Ensure that the content is properly balanced in terms of time and resources available

Completeness: It should properly cater for all the three domains psychomotor (hand skills), Cognitive (head-knowledge) and effective (heart-attitudes/values)

Sequence: it should be properly sequenced *i.e.*, simple to complex, known to unknown and spiraled

Comprehensiveness: It should include all the necessary details needed by a specific learner.

NEED FOR SELECTION

Due to the ever changing society, both local and international, there is needed to select from the abundance of generated knowledge and skills.

There is need to remain current by replacing content that may be outdated.

Quality: There is need to ensure quality

Quantity: There is need to gauge how much to cover on a particular course.

Scope: helps in demarcating or deciding on the breadth and depth of what to cover.

CRITERIA FOR SELECTING CONTENT

Selection of contents is always based on the following criteria:

Philosophical: The knowledge we select must be of established value to participants and the society they are going to serve after learning.

Psychological: This means that what is selected should meet the needs and interests of the learners. The psychology of adult learners should be learned and applied

Sociological/cultural: What society has achieved, its institutions, aspirations, traditions, beliefs, *etc.* should guide selection of content. This is because some of these will themselves form the content of courses.

For example in Uganda today we have issues of gender, environment, self reliance, poverty alleviation, addiction, HIV/AIDS, small scale enterprises *e.g.*, ICT cafes. These are social issues that should be considered when developing curricula.

STRATEGIES USED IN CREATING CURRICULUM DESIGN

Most workshops can be customized to suit the time available for professional development and the audience. Furthermore, the descriptions provide a reference for discussion about what your school's professional development needs are and can be altered to better meet your goals.

DIFFERENTIATED INSTRUCTION

Differentiation is not a novel notion to educators. Even those who are not aware of the exact term *differentiation* realize that in a classroom of students, there are those who are more advanced learners and those that are far below grade level expectations. There are students who have a proclivity for the arts and others who have a tendency to favour the sciences. Some students are content sitting for most of the day at a desk, whereas others are clamoring for time to move about the room or school campus.

Teachers who employ differentiation are aware of student differences and capitalize upon opportunities to challenge all learners taking into account learner interests, readiness, and learning styles. This workshop presents the definition of differentiation, suggestions for introducing differentiation to students, engaging instructional strategies, concrete differentiation strategies and specific examples that can be used directly or adapted to meet the needs of all levels of learners. Publication: *Lesson Design for Differentiated Instruction, Grades 4-9* by Kathy Tuchman Glass with a foreword by H. Lynn Erickson (© 2009, Corwin Press).

THE SIX TRAITS OF WRITING: INSTRUCTION AND ASSESSMENT

Vicki Spandel and a whole host of teachers, along with Northwest Regional Educational Laboratory, created a model for writing called the Six Traits.

This model refers to six qualities of good writing: *word choice, organization, idea development, sentence fluency, conventions,* and *voice.* Research findings support that students show a considerable improvement in writing performance when the six-traits model is used appropriately in the classroom as an instruction and assessment tool.

This workshop provides teachers with an overview of the model, plus engaging lessons, rubrics, other assessments, and strategies with an emphasis on how they are incorporated into an existing standards-based curriculum instead of a stand-alone programme.

This workshop can be tailored to those who are brand new to the model or those familiar with the six traits who need further support. Publication: *Curriculum Design for Writing Instruction: Standards-Based Lesson Plans and Rubrics* by Kathy Tuchman Glass with a foreword by Carol Tomlinson (© 2004, Corwin Press).

CURRICULUM DESIGN FOR WRITING INSTRUCTION

Getting students to produce their best writing is sometimes challenging. In this workshop, Kathy presents a step-by-step backward curriculum design process for standards-based writing units incorporating lessons and assessments that improve students' writing performance.

The design process emphasizes the need for teachers to define success for students prior to writing and measure achievement through appropriate and well-articulated genre-based assessments. Presentation includes explanation and modelling of step-by-step curriculum design process, genre-based writing rubrics, other assessments, and standards-based writing lessons that can be used immediately in classrooms. Publication: *Curriculum Design for Writing Instruction: Standards-Based Lesson Plans and Rubrics* by Kathy Tuchman Glass with a foreword by Carol Tomlinson (© 2004, Corwin Press).

CURRICULUM DESIGN/ESSENTIAL UNDERSTANDINGS/GUIDING QUESTIONS

Kathy works with teachers to design curriculum. She introduces a backward design model and collaborates with teachers to apply what they have learned to revise or create a comprehensive unit of study. This workshop focuses attention on the explanation, use, and creation of essential understandings plus unit and lesson guiding questions to frame standards-based units of instruction. The premise for using essential understandings and questions is to guide students to comprehend the essence of the content, know the concepts that drive each lesson, and maximize their learning potential by gleaning the heart of the curriculum. It is through a concept-driven unit that students come to appreciate and learn facts and skills as they are not taught in isolation, but rather through a deeper lens.

CURRICULUM MAPPING (CURRICULUM YEAR OVERVIEW)

Teachers work with Kathy in grade level teams or representatives to create a curriculum overview that defines a comprehensive instructional path for the school year. Many teachers have a draft of a yearly plan or the standards plotted, but this project is much more involved. Kathy leads teachers step-by-step through the journey of developing a curriculum year overview or curriculum map.

Using this process to delineate all they need to teach in a given school year, teachers establish meaningful connections between content areas, account for district or state content standards, and personalize their overview with specific information that includes: school adopted texts and related materials; subject-specific resources and materials; interdisciplinary connections; guiding questions; skills, activities, and assessments. During the process of creating the map, teachers collaborate in a meaningful way to coordinate instruction both horizontally vertically.

PRACTICAL APPLICATIONS OF CHANGE PROCESS IN IMPROVING THE CURRICULUM

Interest in the improvement of schools and student results has been the focus of rhetoric and action since the 1950s. And while many efforts have been mounted, widespread educational improvement remains unrealized in far too many schools. During the 1996-2000 Regional Educational Laboratory contract, SEDL carried out two projects that hold significant progress.

The first involves the creation of communities of continuous inquiry and improvement as an infrastructure to support improvements in schools. The second focuses on comprehensive school reform, improvement efforts that involve deeper and more extensive change.

CREATING COMMUNITIES OF CONTINUOUS INQUIRY AND IMPROVEMENT

SEDL focused on the creation of communities of continuous inquiry and improvement, or professional learning communities (PLC), early in the contract period, when evidence was growing about the value of such an infrastructure in schools but little information existed on how to build and support these structures. In such communities, the school professionals examined the core relationships they created and experienced with students, reflected on their work with students, and supported one another as they assessed the results of their work with students.

These communities possess five common characteristics: shared and supportive leadership, shared values and vision, collective learning and application, supportive conditions, and shared practice.

FIELD-BASED RESEARCH AND DEVELOPMENT

SEDL identified 24 colleagues from higher education, state education agencies, intermediate service units, school districts, and other organizations

who were interested in working with SEDL to understand how to build such communities. The partners identified 18 proficiencies they thought would be required to undertake this work and created modules to support the proficiencies' development.

These modules are available to others who are undertaking similar work in *Creating Communities of Continuous Inquiry and Improvement: A Collection of Strategies*.

Each of the colleagues (or co-developers) identified a school involved in an improvement effort that also was interested in building a professional learning community.

Over a two-year period, they worked with these schools nurturing the development of the school's PLC and documenting the school's progress. SEDL collected these stories and published them in *Multiple Mirrors: Reflections on the Creation of Professional Learning Communities*.

SEDL also studied five schools (one per state) that created communities of continuous inquiry and improvement and validated an instrument to assess the maturity of such schools. In the course of that work, SEDL developed and published a set of indicators to chart the progress of a school in becoming a community of continuous inquiry and improvement, called *Indicators of Professional Learning Community Development*.

Our work with the co-developers, the study of the five schools, and the development of the instrument produced additional knowledge related to the creation of communities of continuous inquiry and improvement including:

- A community of continuous inquiry and improvement exists when each of the five dimensions is in place and all are interacting together.
- The most logical and effective way to begin developing a community of continuous inquiry and improvement is to bring the professionals together to learn.
- A critical element in these communities is the continuous engagement of staff in inquiry directed towards improving the learning of students.
- Determining school and staff readiness is important.
- Identifying barriers and boosters that will slow down and accelerate the development of a community of continuous inquiry and improvement is important. One may begin by collecting and reviewing student demographic and achievement data.
- The dedication of time for school people to learn and share is critical to the accomplishment of school improvement goals.

The experiences of the co-developers in their respective schools, the case studies of schools identified as operating as PLCs, and the maturity instrument were presented in multiple issues of a periodic publication, *Issues…about Change*. SEDL also published a monograph on research about PLC, *Professional Learning Communities: Communities of Continuous Inquiry and Improvement*. The updated version is titled *Professional Learning Communities: An Ongoing Exploration*.

FACILITATING IMPLEMENTATION OF REFORM STRATEGIES AND TACTICS (FIRST)

For the Facilitating Implementation of Reform Strategies and Tactics (FIRST), SEDL worked directly with one low-performing school in each of SEDL's five states to understand how schools engage in comprehensive school reform. This work focused on the entire school as an interrelated system of parts that impact each other, involved multiple technical assistance providers, and examined existing and proposed structures and practices on an ongoing basis to determine how they impact student learning.

SEDL worked with the school administrators, classroom teachers, and other staff members in these schools over a two-year period. SEDL assisted each school in assessing its strength and weaknesses, identifying a focus for our working together, and developing and implementing a plan for this work. Major components of the work involved examining student performance data, building staff consensus on the work's focus, researching alternatives to address problems in the school, and building shared leadership to carry out one or more of the alternatives. Five factors were identified that influenced school progress: (1) the focus of the improvement effort, (2) organizational structures, (3) personal and social dynamics, (4) contextual influences, and (5) leadership. Findings related to each of these factors are summarized below.

- All of the schools were strongly encouraged to focus their work on improving student performance. Lack of access to and understanding of student achievement data played a large role in the difficulties encountered as each school sought to define and maintain the focus of their improvement efforts.

- Problems that are rooted in leadership, context, and organizational structures almost always affect personal and social dynamics negatively. Similarly, advancement in any of the other four areas tends to support positive dynamics.

- While schools are the locations of improvement work, they are critically affected for better or worse by the contexts in which they exist. External change facilitators must have a wide and deep range of strategies and information to be ready to anticipate and address contextual issues during improvement efforts. Bringing all parties to the table, where possible, is the best strategy in addressing these issues. In all cases, more and better communication—and more and better understanding— mitigated the negative aspects of context, and allowed stakeholders to begin to imagine context as a strength of, and not a hindrance to, their school.

- Leadership plays a pivotal role in any school change effort. Comprehensive school reform efforts advance most effectively and smoothly in schools where principals are committed to high-quality instruction leading to success for every student. These schools also are adept at handling day-

to-day operations as well as the crises, enjoy strong working relationships with district and school staff, and have the professional security and commitment to foster and use teacher leadership.

SEDL included these findings on supporting comprehensive school reform in these schools in the *Issues…about Change* publication.

COMPREHENSIVE SCHOOL REFORM DEMONSTRATION PROGRAMME SUPPORT

To support the U.S., Department of Education's Comprehensive School Reform Demonstration (CSRD) programme, SEDL and other regional labs provided assistance including SEA network meetings, LEA assistance, development and dissemination of products to support CSRD programmes, and research studies to deepen understanding of comprehensive school reform.

State assistance and networking. In the first year, SEDL assisted the five state education agencies in developing their CSRD plans and conducting competitions. In the following years, SEDL responded to individual state requests for assistance, which often were specific to a state's reform context. SEDL also convened the five state CSRD coordinators three times each year to identify emerging issues, share the progress made in each state, and discuss mutual issues. These meetings helped the five coordinators share ideas and solve problems that improved each of their state CSRD programmes.

Local assistance. SEDL provided a series of workshops each year to assist schools and districts in either applying for or implementing a CSRD programme. During three years, nearly 4,000 educators attended. SEDL also sponsored a workshop for 218 CSRD technical assistance providers working with CSRD schools in SEDL's states. These workshops helped facilitate the sharing of information among the local schools and districts, the CSRD technical assistance providers, and SEDL to increase the consistency and coordination of assistance to schools and districts implementing CSRD programmes.

Development of products. SEDL developed a number of products to support the ongoing implementation of CSR programmes. They included the National Database of CSR Awardees, a searchable database available on SEDL's Web site that provides descriptive information on CSRD awards in all 50 states, and *Connections*, a newsletter that addressed issues schools and districts faced as they implemented CSRD programmes. A set of audiotapes, Voices from the Field, describes six strategies that leaders can adopt to support comprehensive school reform. Finally, *Disaggregation without Aggravation*, a resource kit, helps educators understand how to disaggregate and make sense of their student achievement data.

Research studies. SEDL conducted five research studies on implementation issues related to the CSRD programme. The first two studies, "Analysis of Southwest Regional CSRD Competition," and "Analysis of National CSRD Competition," examine the first cycle of CSRD competitions in each of SEDL's five states and in 28 states across the United States. These two studies are

intended to inform SEA and U.S. Department of Education officials on the first cycle of competitions, and suggest improvements to strengthen subsequent competition cycles.

SEDL developed the *Early Implementation Survey* to track schools' status on 10 factors that influence successful school improvement efforts. These factors were identified in SEDL's review of relevant research, development, and dissemination knowledge, *Correlates of Successful Implementation and Change, An Annotated Bibliography*.

SEDL also conducted two sets of case studies to assess the implementation of CSRD programmes in rural schools and schools serving high concentrations of American Indian students. "Rural Implementation Case Studies" revealed that the size of the schools actually helped solve some common implementation problems (*e.g.*, opportunities for staff planning and sharing). In addition, rural schools in this sample selected models with close geographic ties (rather than more nationally known models with technical assistance providers based far away) to resolve access and travel concerns. Rural schools, nevertheless, faced many of the problems associated with implementing large-scale change in their schools.

The second set of case studies, "Native American Case Studies," was conducted to examine the impact of the American Indian culture on the implementation of CSRD programmes. Because few of the models had been developed with American Indian cultures in mind, SEDL was interested in exploring how the American Indian culture interacted with these models. SEDL's case studies showed that few cultural or linguistic accommodations were made in the two CSRD models implemented at the sites. Contextual issues (*e.g.*, turnover and training of staff, parent involvement) played a more significant role than culture in determining the success of these schools.

CURRICULUM DEVELOPERS FOR INDUSTRY AND TRAINING

I have outlined very briefly some of the knowledge and skills an academic curriculum developer has to offer the world of training. Commerce and industry would have much to gain from tapping in to this expertise and using it when and where necessary to assist in designing new courses or training packages or in inducting new curriculum staff.

In the Faculty of Education at Curtin University we are in the process of setting up a Centre of Training and Development which we plan will become part of Curtin's entrepreneurial arm. We have a small but flexible team of experts who could be called on to assist trainers with virtually any aspect of training. I have spoken here only on behalf of curriculum development, but a number of colleagues are here today communicating a similar message from the perspectives of their own specialisms, such as the psychology of adult learning and adult literacy.

Part of our plan is to redevelop our training course materials to be used on or off campus as flexible, modularised, practical learning packages. These would be available singly or as accredited subjects leading to undergraduate or graduate awards. We already have had TAFE teachers and trainers from government, commerce and industry successfully undertake our BA(Ed) and BEd, by distance education as well as on campus. Our graduate and postgraduate programmes also are attracting more and more enrolments from outside educational institutions. These are the directions in which open learning are taking us. We are ready for the demands of the future and believe we have knowledge and experience to fulfil at least a part of this state's training needs.

CURRICULUM LEADERSHIP DEVELOPMENT

Curriculum Leadership Development focuses on the issues and struggles of educational leaders surrounding curriculum leadership in the academic setting. Carol Mullen intends for this book to guide school leaders in the roles of assistant principal, principal, lead teacher, administrative resource personnel, and district coordinators in their efforts to lead the curriculum development process. Mullen also intends for this text to be utilized by graduate students and their professors or instructors who are attempting to develop the aspiring curriculum leaders of the future be they lead teachers, curriculum professionals, or school leaders. Using cases that depict a range of issues that are relevant to curriculum leadership Mullen states that the book not only "focuses on curriculum leadership development at the school level, it also offers educators' reflections on and analysis of real-life curriculum leadership situations".

Curriculum in education is something that is hard to define. Even Aristotle struggled with its definition. It is not surprising, then, that the definition and thus role of curriculum leader has also proven difficult to determine. Oliva (2005) confirmed this, stating, "In the world of professional education, the word *curriculum* has taken on an elusive, almost esoteric connotation". Oliva further noted that we know that administration is the act of administering, instruction is the act of instructing, and supervision is the act of supervising, but we do not really have an "act" for one who works with curriculum. In *Curriculum Leadership Development,* Mullen provides the reader with insight into the issues surrounding the definition and complex role of curriculum leader. The author has introduced a twist on the popular theme of school leader as instructional leader by interjecting curriculum into it, as in *curriculum school leader*, thereby asserting the need for curriculum leadership development for aspiring and practicing leaders. This is idea that builds on the instructional leadership theme by taking it to the level of comprehensive school reform. Accordingly, Mullen acknowledges the changes and effects of recent legislation on the curriculum development process within schools.

By using scenarios based on the writings and action research of practitioners, Mullen places the reader in a position of observing curriculum leadership from the perspective of those involved in the process. She has worked closely with

these emerging leaders to present these scholarly writings "through the lenses of action researcher and scholar-practitioner", and has centred the writings of these practitioners on the following questions:

- What does the concept of curriculum leadership mean to you, and how do you make sense of it in practice as an action researcher?
- What do you believe are the flagship curricular questions and challenges facing schools and society today?
- What challenges in the role of curriculum leader most affect teachers and principals personally as well as professionally?

This text offers readers many practical and real-life scenarios covering topics relevant to today's schools for utilizing in their efforts to implement curriculum leadership in their particular schools or in their courses that prepare future school leaders. The use of case study and action research in the book was chosen to provide the reader with a richer and more in-depth look at the issues presented. By utilizing case study and action research, Mullen has provided the reader with the means to look at the phenomenon of curriculum leadership from the perspective of others and place those experiences within his or her own natural settings. Case study allows one to share in the experiences of others and by doing so make sense of one's own experiences. Aspiring and current school leaders should find information in this book that will prove beneficial to them as they seek to gain an understanding of the complex task of curriculum leadership. Higher education faculty may also glean ideas and real-life scenarios that can assist them as they prepare aspiring school leaders in dealing with the curriculum leadership aspect within their roles. Mullen's reputation as an expert in the field of educational leadership secures her authority and credibility concerning this topic. She is an Associate Professor of educational leadership at the University of South Florida and the coordinator of the New Faculty Mentoring Programme at the university's College of Education. She also serves as the Editor of the refereed international journal *Mentoring & Tutoring: Partnership in Learning*.

CURRICULUM LEADERSHIP

The book contains 16 chapters organized into 3 sections. Mullen begins by discussing the need for curriculum leadership and the issues and trends that have surrounded curriculum development, including the key thinkers in the field of curriculum. Although literature has called for principals and school leaders to become instructional leaders, Mullen proposes that this role should be further refined, culminating in the school leader's ability to provide curriculum leadership in schools. The second section contains case studies that provide vast coverage of topics surrounding curriculum leadership followed by practical and reflective activities that stimulate thought-provoking discourse on the subject. The final section is written for those involved in preparing future curriculum leaders and activities that can be used by higher education professionals in master's or doctoral level courses in curriculum or leadership.

Through the scholarly cases presented by 17 school-based contributors, Mullen presents several lessons that were learned. The first is that, although the current atmosphere in education surrounds high-stakes testing and curriculum development that provides students the means for success for accountability purposes, curriculum leaders actually go beyond this by desiring to provide experiences for learners that "stretch beyond the classroom" in an effort to support comprehensive school improvement. Building on this lesson, the second concept reminds readers that the curriculum is not just "…student achievement, test scores, grades, prepackaged curriculum materials, academic or professional standards, policies, guidelines, or tests", but rather that all of these elements play a role in curriculum development.

Finally, Mullen and the contributors, all of whom are graduate students in educational leadership and other educational programmes, provide insight into curriculum leadership as a concept and practice by reminding readers that the process is not only tied to academia but that it actually has personal, professional, and political dimensions. These lessons, pertaining to curriculum leadership, are presented within the three sections "Trends and Issues in the Study of Curriculum Leadership," "Curriculum Leadership Cases for School and Faculties," and "University-Based Curriculum Leadership Exercises."

CURRICULUM DESIGN AND DEVELOPMENT

There is an enormous amount of published research and debate on these areas, ranging from the simple how to do it prescriptive approaches to retrospective analyses of the design decision making process itself.

The literature contains long running and wide ranging debates on prescription and description; the pros and cons of performance objectives; competency based or awareness raising learning; teacher centred or student centred learning, and so on. In the vocational training area the debates extend into areas like assessment by marks or mastery; designing for articulation or courses designed as intrinsic entities (Hermann et al, 1976); training for flexibility and mobility or for one specific job; the importance of cognitive processes as against product achievement. To one side of the mainstream curriculum design and development literature, but still part of it, are the fields of educational technology; instructional design; resource development; and alternative learning systems such as self paced learning, modularisation, distance education and open learning.

It is interesting to note that the greatest number of curriculum practitioners work in the design and development area. There is a common misconception that design and development is curriculum development. There is also a common misconception that anybody who knows about the content area can sit down and write courses about it. This narrow approach has slowly changed in the TAFE sector over the past ten years and anyone who has been involved in that change can look back with amazement at the "arm chair" practices of the past.

Let me tell of my own experience. I became a curriculum developer in the Department of TAFE in South Australia a little over a decade ago. I had just

returned from the UK with a post graduate qualification in curriculum studies, thinking I was ready to ride the rising wave of curriculum change in Australia. The market, however, was not ready for a curriculum generalist. Potential employers could not understand what I had to offer. "A curriculum developer in what?" people asked me. "In what field do you write curriculum?" I found it just as difficult to understand their questions as they did to appreciate where I fitted into the curriculum field.

Eventually I was employed. I was given a desk and chair, a telephone, stack of paper, and probably a pen, and told to sit there and develop curricula for Adult Aboriginal Education. That is what they thought it was all about in those days. As a consequence of what I considered an impossible task, I may have done one of the first formal training needs surveys in South Australia!

Practice slowly began to catch up with theory and research. These days we emphasise the need for team work, for good communication and for encouraging input and shared ownership in the design and development process. The curriculum developer needs to work side by side with content experts and the technicians who will produce the finished package.

The design process involves developing a course specification. The design team use the needs analysis data to decide:

- Level (operative, technician, para professional, management);
- Length (short course, 1 semester, 2 years. 3 years);
- Structure (full time, part time, day or evening classes, block release, internal or external delivery, fleximode, *etc.*);
- Format (modular, subject based, self paced);
- Sequence of the content;
- Resources;
- Assessment style (continuous assessment, examinations, balance of theory and practical);
- Accreditation;
- Cost; *etc.*

The development process consists of writing up or producing the curriculum materials, including course objectives, content, learning experiences, assessment, and resources. Many of the early writers insisted that course development should begin with selecting and writing objectives and developing procedures to test whether the objectives had been achieved. In the 1970s a number of studies appeared proving that reality is not like that (*e.g.,* Decker Walker, 1975). My own experience involved working with many content specialists who could not, or would not, start with objectives. Some positively resisted it. A curriculum developer has to work with the team he or she has and if such people cannot cope with the initial definition of objectives, there is no reason not to begin instead with the content, the teaching notes, student workbooks, or project and resource development. Content experts and teachers often have the objectives in their heads and the curriculum developer can extract them fairly easily as the course materials take shape.

There are several important points to remember when writing curriculum materials, especially materials to be used by the students, and this includes all open learning materials. They need to be written with the student firmly in mind, so that they are addressed to the student, in the right language and at the right level. They should be friendly and easy to follow. There is little point in producing long and boring chunks of information, no matter how serious the writer might consider that information to be. They should be broken up with revision or recycling exercises to keep the student awake and to facilitate the learning process. They should have clear and well organised headings and appropriate diagrams. The size of headings, the number of words to a line, and hence the size of margins, the font and size of characters need to be carefully considered. The inclusion of drawings and cartoons, when appropriate, will not normally distract from the seriousness of the content. Resource development is a large area for the curriculum development team as well. Much has been written about the choice of media for educational purposes, but as most people who are interested in open learning and new technology have had experience in this, I need not include more about it here. However, it is important to note that with open learning, where students have more control over their own progress than in traditional learning, the design and development stages become even more critical.

DISSEMINATION AND IMPLEMENTATION

This is an area often neglected in all sectors of education and training, despite nearly twenty years of research to prove how important it is in the curriculum process.

In the 1960s and 70s millions of dollars were poured into curriculum projects in schools all over the United States (Fullan & Pomfret, 1977). The teams who developed these exciting and attractive packages believed that because they were good, teachers would use them and use them properly. However Fullan and Pomfret discovered that this was not the case. They set out to discover what had happened to a number of curriculum packages which had been in the schools for ten years or more. The curriculum development world in the USA was shocked at the results. Many packages could not be found; others were sitting in dusty storerooms, unused; parts were being used but in ways not intended by the designers and others had been adapted and changed out of all recognition. Thus began a whole new field of curriculum research to discover how and why this had happened. Basically it came down to the lack of formal marketing strategies, or dissemination, between the curriculum developers and the users of curricula.

As an example of teacher misuse of curriculum materials, I would like to mention a curriculum project which some of you may remember. The Nuffield Science project was developed in the UK and was fairly rapidly introduced throughout the English speaking world. It was based on sound learning theories and came out of the school of thought whereby education was to be based on

the essence of the discipline to be taught. What is the essence of being a scientist or an historian, for instance? The Nuffield Science project was written on these essential scientific behaviours and included a strong emphasis on deductive learning. However, later evaluation found that experienced science teachers became impatient with deductive learning. They knew what the students needed to know to pass their exams and they were restless waiting for students to discover things for themselves. It was quicker and more effective to *tell* the students what they were expected to discover and to move on with the course in the way they had taught it before. Thus the whole *raison etre* of the new curriculum was undermined and the *meaning* of the change was lost. As Rudduck (1970) described it, the teachers had not undergone the *cultural change* involved in the new curriculum.

Curriculum dissemination and implementation have continued to come under the spotlight in the USA with the large Rand Corporation study in the 1970s (Berman and McLaughlin, 1978) and the even larger Crandell study in the 1980s (Crandell, et al, 1983).

Emphasis was put on the need for staff development, good communication networks between disseminators and users, feedback, teacher ownership of curriculum materials, institutional and resource support, incentive schemes and so on, as ingredients of successful implementation.

In spite of the evidence, we have not changed our ways in vocational and adult curriculum development. It is assumed that if the instructional design and the development is well done, it will be correctly understood and taught when the training course is implemented.

It is assumed that our captive instructors and students will automatically benefit from the product and the intentions of the curriculum development team will be fulfilled. It is also assumed that the instructors will interpret and deliver the curriculum material in the way the curriculum developer intended no matter who is appointed to the job or what their teaching qualifications might be.

An argument sometimes used against planning dissemination and implementation strategies is that it is extra expense to be tacked on to an already expensive development process. In the case of Federal or State funded curriculum projects, costing for dissemination is too often omitted and the project is put into operation without considering the misuse that could occur.

There is not much research into dissemination and implementation of vocational training in Australia as yet, but what there is (McBeath 1990) indicates that there is significant frustration amongst TAFE teachers when trying to cope with new curricula without sufficient staff development, communication or involvement in the development stage. The research interviewed teachers in four new TAFE courses and of these only one could be considered to have been successfully disseminated and implemented. One success in four in the relatively well developed TAFE curriculum management system indicates that there could be an even higher number of ineffective course implementations in the wider training world.

It is doubly important to plan dissemination strategies for open learning delivery, in that innovation needs to be accepted not only by instructors and tutors, but that the entire instructional message must be understood and accepted by students who might be working completely alone. If teachers had problems in understanding and accepting the meaning of change, then students will certainly find it difficult without clear, detailed, individualised explanation. This is an added challenge for curriculum developers who have never been very good at dissemination and implementation strategies.

6

Principles of Curriculum Construction

'Curriculum'-the term has been derived from Latin, meaning 'race-course'. In education curriculum means 'the course of studies' to be followed by pupils in their schools. 'the curriculum may be defined as the totality of subject matter, activities and experiences, which constitute a pupils school life'.

The 'Twenty Ninth Year Book' (N.F.S.) states thus;

> *"A course of study is the material usually in pamphlet form which sets forth for the teacher such items as the objectives and content of a given subject and the activities and books to be used to accomplish desired results"*

Monroe says;

> *"The curriculum is the child's introduction to life, as schooling is the preparation for it".*

When the aims and objectives have been defined precisely and in concrete terms, the necessity of framing a curriculum on the basis of psychological, social and pedagogical considerations should arise. Concrete principles for realizing the goal should be devised. H. Spencer points out that our first step must be to classify in order of their importance, the leading kinds of activity which constitute human life. Education has become life-centric and child-centric too. So it has been said,

> *"A rationally conceived curriculum must be resultant of the two forces-the nature of the child and the requirements of the community".*

The modern trend implies that all the attentions of education should be focussed on the child from all perspectives. The aim of education should be the development of the child as a perfect and worthy member of the society.

Similarly, the curriculum should be so framed as to bring the child into the center and to help him developing-*i.e.*, the growth of the child through the graded phases of development-physical, mental, moral and social.

Basic Principles:

1. *In the first place,* the curriculum should not merely be a theoretical study of certain branches of knowledge, unrelated to the child's life-interest. The subject matter of the curriculum should be directly related with complexities of modern life. Through active participation in varied activities and experiences provided by the curriculum, he should derive useful skills, habits, knowledge, power of appreciation, attitudes and human values needed for his living in present world.

2. Children tend to have different abilities and tendencies. So adults should not impose a fixed set of course materials for all. It should so arranged that it can meet different needs of health, physical growth, reasoning, judgment, imagination of different child.

3. *Thirdly,* a child's psychological traits find expression only through society. Hence, the curriculum should be organized with an eye to social demands, social problems and needs of the growing child.

4. *Fourthly,* there must be provision for vocational training so that a child is enabled to earn his livelihood in this competitive world.

5. Fifthly, the curriculum should be thought of in terms of activity and experience tater than of knowledge to be acquired and facts to be stored. It must be activity based and there should be provision for work-education. It should include various types of useful experiences like music and fine arts, physical activities and other necessary social experiences. The work-shop and school should be combined.

6. Logical arrangements and compactness of matter must yield to psychological ordering of materials in accordance with the child's developing interests and ideas in the particular subject-area.

7. Correlation and co-ordination of the course material is of out most importance at every stage. The full course should be made in such way that it is in accordance with the child's ability. In each stage different areas of learning should be correlated and taken up together as far as possible.

8. The curriculum should also be framed in such a manner that 'it is an individual whole' having objective areas of different aspects learning. The diversified course should cater to the individual aptitudes and abilities.

9. *Ninthly,* the curriculum should include all those activities and experiences which are least likely to be provided satisfactorily by other educational agencies.

10. Sir Nunn points out,

    'In every subject the pupil is to have the joy of discovery, of creative activity, he is to be satisfied with the travail of his own soul'. 'In a well-planned educational system, opportunities will be provided at every level to the pupils for the exercise of their reflective powers, artistic abilities and practical work'.

Lastly, the curriculum should purpose the individual not only for life of work but also for life of leisure, by exploring and developing the recreational resources. It should be flexible, adjustable and dynamic-in harmony with the needs of pupils and changing conditions of society.

THE CONSTRUCTION PROCESS

UFAL nominated a team to run the tasks of curricular reform. The commission began the collective construction of the new curriculum for the medicine course two years ago using, mainly, the technique of strategic planning and, involving about 40% of the faculty of the course, student union, teaching monitors, technicians of the General offices of Health of the State and Municipal district.

The results of these activities were edited in a sequential and textual way, and introduced the academic community to subsidize a new stage of the construction.

The text had the intention of answering questions as:
  Why changing?
  What is there to change?
  How to change?
  Is it possible to change?
  Where is my place in the proposal?
  What are objectives of our course?
  What modules and contents do these objectives contemplate?
  What is the manager's role in the conduction of this curriculum?
  What administrative structures are planned?
  What the necessary infrastructure?
  What infrastructure is necessary?
  What are the necessary partnerships?

The textual presentation format of the proposal didn't impact strongly as previously expected.

One of the largest difficulties found by our reform commission is in the visualization, for the teachers, technician, students, managers and partners (services and community) of the role of each one of the elements, in the development of the curriculum, when this has been introduced in a sequential and textual way.

There are few publications, made available by the literature, that contemplate the academic community's inquietude in the construction of the curriculum, facing the difficulty of seeing inside its text and context. This hinders the suggestions and the planning of the necessary actions above to answer the mentioned questions.

There is urgency, therefore, in rethinking the drawing of presentation of the proposed new curricular. This is obtained through the use of tools that allow the actors of the process an including vision of the necessary interactions to the course and, consequently, it can aid the development of a larger meaning learning.

Inside of the possibilities of a better vision of this curriculum the linkage appears with the technique of conceptual mapping. This technique is an approach created by Novak (1977), based on constructivist theory (Cognitive Psychology of Ausubel). He understands that the individual builds his knowledge and meanings starting from his predisposition to accomplish this construction.

Conceptual Map and Curricular Development

The significant learning theory (Ausubel et al, 1978), which has been influencing the education enormously, follows a constructivist model of the human cognitive processes. In matter, the principle of assimilation describes how the student acquires concepts, and how his cognitive structure is organized. The fundamental premise of Ausubel is illusory simple: "The significant learning happens when new information is acquired by a deliberate effort on the part of the apprentice in tying the new information with concepts or preexistent relevant propositions in his/her cognitive structure. (Ausubel et al., 1978)"

Ausubel (1978) proposes that the cognitive structure can be described as a series of organized concepts in a hierarchical way, which would represent the knowledge and a person's experiences then (Novak, 1977). In this context, the concepts would be defined as "registrations of events or objects" to which a "label or name" were associated (Ford et al, 1991). This is the origin of the representation of the knowledge through "Maps" of concepts and their connections.

The Conceptual Maps, developed by John Novak (Novak, 1977) are instruments used as a language for description and communication of concepts of the theory described by Ausubel previously. Such a structure involves from the including concepts to the least inclusive ones. They are used to aid the ordination and the nested sequencing of the teaching contents, in way to offer appropriate incentives to the student. The conceptual maps have been used a lot as an important teaching instrument, learning and evaluation in the area of the health, mainly for the nursing (Rooda, 1994; Irvine, 1995; Beitz, 1998; Weiss & Levison, 2000), but some authors have been suggesting that the conceptual maps are a powerful instrument in the development of a curriculum (Starr, 1990; Van Neste-Kenny et al, 1998; Harden, 2001; Prideaux, 2003). However, there are papers on this subject, which leads us to argue if the use of the technique of Conceptual Map can promote better visualization of the actors' role and their actions in the construction of a new curriculum.

This work aims to show how to elaborate a "curricular map" to represent the main concepts of the new proposal, allowing to the actors of the process a wide vision of the interactions and of the needs of changes demanded by a new curriculum.

Methodology

Formation: Initially, the commission of curricular, teachers' group that is captaining the construction of the new proposal, participated in a course of 8

hours about map construction. Hierarchization of the Concepts: After the training, the key concepts for the new proposal were nested and classified in:

>*"Changing propeller factors: Social, Institutional, Individual*
>*"Objectives of the Medical Course of UFAL*
>*"Steering principles of the reform curricular*
>*"Necessary changes in the curriculum to follow the new curricular guidelines*
>*"Presentation structure of the new general pedagogic proposal*

Construction of the First Map Curricular: The first curricular map was built by members of the reform commission tends as document base the text edited with the results of the several workshops happened in 2002/2003. It intends to build new maps starting from the demands generated by the initial map that contemplates the general structure of the new curriculum. For larger visibility and socialization of the elaborated map, this was put on a cork board, attached on a wall. When visualizing the map it can be observed the concepts that were already treated, the gaps and demands still existent, as well as the necessary changing actions, the coherence and the interconnection among the defined principles.

Results

An important result of the construction of the map of the reform of our curriculum was the actors' active involvement in the identification of the steering principles, and of the changing needs in the curriculum. This way we can achieve the objectives of the medical course of UFAL. During the elaboration period the information were synthesized for the construction of the visual representation of the first map curricular contemplating the inquiries: Why changing? What for changing?

What are the objectives of the course of medicine of UFAL? What will be the steering principles of the new curriculum? What are the necessary changes? What strategies are necessary to render them? How much did the group already walk in this direction? What are the next steps? What type of curricular organization should be proposed to contemplate the social demands of the State, the new national guidelines for the medical course and the objectives of the course?

The necessary negotiations for the construction were developed naturally; because these concepts were discussed during the workshops previously happened.

For the reform team, teachers' group that have been participating actively of the elaboration of the new curriculum, the construction of the map appeared as a powerful tool in the visualization of the demands originated from of the curricular reform, in the identification of the relationship among the concepts and of the gaps still existent for the consolidation of the curricular proposal curricular.

TYPES OF CURRICULUM

NATIONAL CURRICULAR FRAMEWORK

The national curricular framework for elementary and secondary education is envisaged in the context of the National System of Education as elaborated earlier.

The basic features and the main thrusts of the curricular framework are as follows:

- Emphasis on the development of human resources for the realisation of the national goals of development.
- Broad-based general education to all learners at the elementary (primary and upper primary) secondary stages.
- A common scheme of studies for elementary and secondary stages.
- The common core components comprising the following: The history of India's freedom movement;
  The constitutional obligations; Content essential to nurture national identity;
  India's common cultural heritage; Egalitarianism, democracy, and secularism;
  Equality of the sexes;
  Protection of the environment;
  Removal of social barriers;
  Observance of the small family norm; and Inculcation of the scientific temper.
- Emphasis on defining Minimum Learning Outcomes (MLOs) for each area of learning at all stages of education.
- Provision for flexibility in terms of selection of content/components and learning experiences which would facilitate the attainment of minimum learning outcomes laid down for each stage of school education.
- Emphasis on child-centred and activity-based processes rather than the teacher-centred approach during the transaction of curriculum.
- Recasting of the examination system and introduction of continuous and comprehensive evaluation that incorporates both scholastic and non-scholastic aspects of education spread over the total span of instructional time.
- Establishment of an appropriate machinery, such as a National Testing Service (NTS) for the selection, and the development of norms of comparable competence across the nation.
- Applicability of the curriculum to all learners, irrespective of their modes/channels of learning in order to ensure comparability of attainment and to facilitate horizontal and vertical mobility of the learners.
- Provision of essential facilities for effective transaction of curriculum in all schools/non-formal learning centres.

MINIMUM LEVELS OF LEARNING

In order to bring about a broad commonality in the standards of education throughout the country, emphasis has been laid on the introduction of the norms of minimum levels of learning for each stage of school education indicated in terms of minimum learning outcomes to be attained by all the pupils in respect of each curricular area at each stage of school education. The minimum learning outcomes for each curricular area will have to be specified keeping in view the research findings regarding the mental ability of pupils at different stages of their development and the academic and physical resources that could be made available in the school for effective transaction of the curriculum.

The emphasis on defining the Minimum Levels of Learning highlights the importance of the integrative nature of learning-evaluation. Put differently, learning (development) and evaluation (assessment) have been construed as two inseparable aspects of the same phenomenon. It is futile to evaluate the progress of the learners towards the stated objectives unless It is ensured that conscious efforts have been made to provide adequate and appropriate learning experiences for growth and development. Thus a major shift from evaluation (passing judgement) to learning (development in terms of desired objectives) has been advocated.

While emphasis has been laid on the introduction of the norms of minimum levels of learning and adoption of a common scheme of studies at different stages of school education, flexibilty is envisaged in the selection of comer it and learning experiences as well as in the selection of strategy for curriculum transaction in order to make leaning more relevant to the needs and environmental contexts of the pupils and to allow scope for initiatives and experimentation on the part of the teacher, the school and the local educational authorities. A high degree of flexibility and local initiatives are envisaged in designing and introducing remedial and enrichment programmes and materials not only by the State educational authorities but also by the individual schools and teachers to cater to the needs to slow and fast learners studying in the same class/grade in a school. However, the scope for flexibility in the methodology and approach to transaction of curriculum is not expected to be used for introducing differential courses or similar measures which would accentuate desparities in standards of education in different parts of the country.

COMMON CORE COMPONENTS

While the rationale underlying the school curriculum of a country reflects its socio-cultural and political ethos, its faithful transaction reflects the genius of its people. The search for national identity has been on since the resistence to colonisation of the country began. This search has not ended yet.

As a matter of fact it is more acutely felt now than ever before. Therefore it is but natural that there is a strong plea for centering the curricular efforts for promotion of national integration and social fusion and cultivation of values as enshrined in the Constitution. Thus an important aspect of the common core

components is the emphasis on instilling a nationally shared perception and values and creation of an ethos and value system in which a common Indian identity could be strengthened.

The ways and means have to be found out to introduce the common core components at all levels of school education. Some suggestions are offered to initiate action on the subject. After the minimum learning outcomes and related general content are identified for each area of learning and for each grade, further scrutiny may be made to explore the possibility of infusing the specific core component with the theme.

Where such natural infusion is not possible, an attempt can be made to select new content for each of the ten components to be added as topics/units to each relevant subject. One can envisage cyclic development of a new course of study pertaining to each of the components. For example, a set of courses on the history of India's struggle for freedom can be developed for grades I to X, independent of other subjects. On the other hand, it is also possible to integrate such content appropriately in the regular subjects included in the present scheme of studies.

An eclectic organisation is possible by, way of integrating clusters of components such as social science components or science components or moral value components and designing syllabi for different grades.

At the primary stage, core components could be integrated with language and environmental studies so as to make them a medium to develop appreciation of culture and perception of the individual, social and national identity through activities, songs, stories, reading material, plays, skits, *etc.*

At the upper primary stage, both infusion and unit approach could be adopted. At the secondary stage, the elements of civics, economics and sociology may be identified in an integrated manner. In addition to the common core components, the integrated course could cover the content which would reflect the contribution of India in the field of science, astronomy, metallurgy, medicine, creative arts, *etc.* in the ancient, medieval and contemporary periods. The core components could be made more interesting through visuals and biographical notes of scientists and eminent Indians in different fields. However, while introducing the core components, it is necessary to ensure that the depth and coverage of information is kept at the appropriate level and does not increase the total information load beyond the existing level in different subjects. This could be done by reducing the content in some of the existing subject areas and properly blending the core components in the total scheme of studies as far as possible.

FORMULATION OF OBJECTIVES

In curriculum organisation, formulation of objectives has a significant place because of the fundamental role they play in determining the content, strategies and evaluation as components of curriculum cycle. While identifying objectives, it is necessary to proceed towards various degrees of specificity, from very

general objectives of curriculum, through somewhat specific objectives for each stage of education, to precisely stated specific objectives of each subject area in the form of expected learning outcomes indicating what exact behaviour would a learner be able to demonstrate after the curriculum transaction.

Thus, the curriculum organisers are required at the outset to indicate overall objectives of curriculum which would coincide with the overall aim of school education. It is necessary to further formulate carefully the stage-wise objectives keeping in view the developmental characteristics and level associated with different stages of education. Each subject area would have its own specific objectives clearly defined in terms of behavioural outcomes. Put differently, efforts should be directed at the achievement of a particular set of objectives for which specific learning experiences are provided under a particular subject area. However, it should not be forgotten that human learning makes one unified whole and that separate subject areas have been created only for the sake of convenience.

For education to help our country to express and promote its unique socio-cultural identity, to meet the challenges of the times and to develop appropriately its human resources, the objectives will have to be formulated with utmost care keeping in view the national priorities and values enshrined in our constitution, socioeconomic and cultural considerations, position of physical resources, global inter-relationships, pedagogical concerns and nature and level of learners. Needless to mention, objectives related to Common Core Components should be given a central place.

GENERAL OBJECTIVES OF EDUCATION

School curriculum, on the whole, should aim at enabling the learners to acquire knowledge, develop concepts, and inculcate skills, attitudes, values and habits conducive to the all-round development of their personality and commensurate with the social, cultural, economic and environmental realities at national and international levels.

School curriculum should, therefore, help to promote development in the learner of:

> *Language abilities and communication skills needed for social living and further learning;*
> *Competencies that facilitate mathematical operations and their applications in day-to-day life and learning;*
> *Knowledge, attitudes and habits necessary for keeping physically fit and strong in conformity with normal developmental pattern;*
> *A proper understanding about the role and importance of sex in human life, and healthy attitude towards sex and members of opposite sex;*
> *Qualities that make a man socially effective and happy in various social settings such as friendliness, coopera-tiveness, compassion, self-descipline, self-criticism, self-control, humour, courage, love for social justice, self-control, etc.;*

Moral and character values such as honesty, truthfulness, dependability, courtesy, fearlessness, compassion, etc.

Pre-vocational/vocational skills, willingness to work hard, entrepreneurship and dignity of manual work necessary for increased productivity and job satisfaction;

Ability to appreciate and discover beauty in various life situations and integrate it into one's own personality,

Understanding of the environment and its limited resources and the need for conservation of natural resources and energy;

Appreciation of various consequences of large families and over population and need of checking population growth;

Understanding of the diverse cultural and social systems of people living in different parts of the country and the country's composite cultural heritage;

Appreciation for the need of a balanced synthesis between the change-oriented technologies and the continuity of country's cultural heritage;

Knowledge of national symbols and desire and determination to uphold the ideals of national identity and unity;

Capability of appreciating and tolerating differences and diversities of various sons and the capacity to choose between alternative value systems;

An awareness of the inherent equality of all and need of global fraternity with a strong commitment to humane values and to social justice;

Scientific temper characterised by spirit of inquiry, courage to question and objectivity leading to elimination of obscurantism, superstition and fatalism;

Knowledge of scientific methods of inquiry and its use in solving problems;

Appreciation of sacrifices and contributions made by the freedom fighters and social workers in the country's freedom struggle and social regeneration, and readiness to follow their ideals;

Appreciation of and readiness to practice in life the national goals of socialism, secularism, democracy and nonviolence.

Divergent and independent thinking and ability to discover new relationships and combinations;

Qualities and characteristics necessary for self-learning and for life-long learning leading to creation of a learning society

OBJECTIVES AT VARIOUS LEVELS OF EDUCATION

The emphasis on the 'child-centred approach' to education necessarily implies that objectives of education to be achieved at a particular stage/class level should be determined carefully, keeping in view the norms of development-physical, mental, social, emotional and moral of children of relevant age group. Exact

expected learning outcomes related to each objective for a particular class should be precisely worked out. Most of the objectives indicated above will continue through various classes. However, the level of achievement with regard to a particular objective will be rising from one class to another class in a spiral fashion.

Thus there will be a sort of learning continuum so far as targets of achievement with regard to a particular objectives are concerned and it will reach its terminal point at a particular class level depending on the nature of the concerned objectives.

CHARACTERISTICS OF A LEARNER

At the pre-primary stage, a child is at the pre-operational stage in terms of his mental processes. At this stage, the child's thinking remains pre-logical and is greatly influenced by perception and sensory experience. Intuitive thought begins at this stage and he/she can distinguish between different appearances of the same objects. However, there is no fully developed conceptualization of objects.

As compared to the kind of thought that involves true logical operations, intuitive thinking is rigid and irreversible. A child at pre-primary stage finds difficulty in putting sticks of different lengths together to form a series from shortest to longest. But he/she finds no difficulty in putting them in pairs and indicating which one of them is shorter. The difficulty arises in making a longer series. The same difficulty arises with respect to space.

The child enters the primary stage with the mental processes largely in the concrete operational stage. During this stage the child begins to think logically about the real world but is very much tied to concrete situations. There occur operations both of the logical and the arithmetical kind and also in the regions of space and time. These operations, however, are still carried out only on objects involving concrete situations. He/she still finds difficulty in generalising from one situation to another. But the intuitive structures, which have been more or less rigid and irreversible during the pre-operational stage, gradually lead to processes of higher thinking.

At the upper primary stage, the learner gradually moves on to the formal operational stage which starts from the age of about 12 onwards and goes on through adolescence. At this stage he/she will gradually be able to think logically in terms of all the hypothetical situations relevant to a particular problem. The operations previously performed only on what is closely related to concrete experiences can now be applied to propositions, either verbal or numerical. At earlier stages, formal logic and mathematical deductions have been difficult for the learner. At the stage of formal operations, he/she will be able to think logically and perform mathematical deductions.

Since the intellectual development varies from age to age, it is essential that the curriculum is designed in consonance with these stages. New ideas and knowledge should be presented at a level consistent with the child's stage of mental development.

TAXONOMY OF EDUCATIONAL OBJECTIVES

The Taxonomy of Educational Objectives, often called Bloom's Taxonomy, is a classification of the different objectives that educators set for students (learning objectives). The taxonomy was proposed in 1956 by Benjamin Bloom, an educational psychologist at the University of Chicago. Bloom's Taxonomy divides educational objectives into three "domains:" Affective, Psychomotor, and Cognitive. Like other taxonomies, Bloom's is hierarchical; meaning that learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels (Orlich, et al. 2004). A goal of Bloom's Taxonomy is to motivate educators to focus on all three domains, creating a more holistic form of education.

Most references to the Bloom's Taxonomy only notice the Cognitive domain. There is also a so far less referred, revised version of the Taxonomy, published in 2001 under the name of "A Taxonomy for Learning, Teaching, and Assessing."

AFFECTIVE

Skills in the **affective domain** describe the way people react emotionally and their ability to feel another living thing's pain or joy. Affective objectives typically target the awareness and growth in attitudes, emotion, and feelings. There are five levels in the affective domain moving through the lowest order processes to the highest.

RECEIVING

The lowest level; the student passively pays attention. Without this level no learning can occur.

RESPONDING

The student actively participates in the learning process, not only attends to a stimulus; the student also reacts in some way.

VALUING

The student attaches a value to an object, phenomenon, or piece of information.

ORGANIZING

The student can put together different values, information, and ideas and accommodate them within his/her own schema; comparing, relating and elaborating on what has been learned.

CHARACTERIZING

The student holds a particular value or belief that now exerts influence on his/her behaviour so that it becomes a characteristic.

PSYCHOMOTOR

Skills in the psychomotor domain describe the ability to physically manipulate a tool or instrument like a hand or a hammer. Psychomotor objectives usually focus on change and/or development in behaviour and/or skills. Bloom and his colleagues never created subcategories for skills in the psychomotor domain, but since then other educators have created their own psychomotor taxonomies.

COGNITIVE

Skills in the cognitive domain revolve around knowledge, comprehension, and "thinking through" a particular topic. Traditional education tends to emphasize the skills in this domain, particularly the lower-order objectives. There are six levels in the taxonomy, moving through the lowest order processes to the highest:

KNOWLEDGE

Exhibit memory of previously-learned materials by recalling facts, terms, basic concepts and answers:
- Knowledge of specifics-terminology, specific facts
- Knowledge of ways and means of dealing with specifics-conventions, trends and sequences, classifications and categories, criteria, methodology
- Knowledge of the universals and abstractions in a field-principles and generalizations, theories and structures.

Questions Like: What are the health benefits of eating apples?

COMPREHENSION

Demonstrative understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas:
- Translation
- Interpretation
- Extrapolation.

Questions Like: Compare the health benefits of eating apples vs. oranges.

APPLICATION

Using new knowledge. Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way
Questions Like: Which kinds of apples are best for baking a pie, and why?

ANALYSIS

Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations:
- Analysis of elements
- Analysis of relationships
- Analysis of organizational principles.

Questions Like: List four ways of serving foods made with apples and explain which ones have the highest health benefits. Provide references to support your statements.

SYNTHESIS

Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions:
- Production of a unique communication
- Production of a plan, or proposed set of operations
- Derivation of a set of abstract relations.

Questions Like: Convert an "unhealthy" recipe for apple pie to a "healthy" recipe by replacing your choice of ingredients. Explain the health benefits of using the ingredients you chose vs. the original ones.

EVALUATION

Present and defend opinions by making judgments about information, validity of ideas or quality of work based on a set of criteria:
- Judgments in terms of internal evidence
- Judgments in terms of external criteria

Questions Like: Do you feel that serving apple pie for an after school snack for children is healthy? Why or why not?

Some critiques of Bloom's Taxonomy's (cognitive domain) admit the existence of these six categories, but question the existence of a sequential, hierarchical link. Also the revised edition of Bloom's taxonomy has moved Synthesis in higher order than Evaluation. Some consider the three lowest levels as hierarchically ordered, but the three higher levels as parallel. Others say that it is sometimes better to move to Application before introducing concepts. This thinking would seem to relate to the method of problem-based learning.

STEPS FOR CONSTRUCTING A TEST

PLANNING THE TEST

Planning of the test is the first important step in the test construction. The main goal of evaluation process is to collect valid, reliable and useful data about the student.

Therefore before going to prepare any test we must keep in mind that:

DETERMINING THE OBJECTIVES OF TESTING

A test can be used for different purposes in a teaching learning process. It can be used to measure the entry performance, the progress during the teaching learning process and to decide the mastery level achieved by the students. Tests serve as a good instrument to measure the entry per-formance of the students. It answers to the questions, whether the students have requisite skill to enter into

the course or not, what previous knowledge does the pupil possess. Therefore it must be decided whether the test will be used to measure the entry performance or the previous knowledge acquired by the student on the subject.

Tests can also be used for formative evaluation. It helps to carry on the teaching learning process, to find out the immediate learning difficulties and to suggest its remedies. When the dif-ficulties are still unsolved we may use diagnostic tests. Diagnostic tests should be prepared with high technique. So specific items to diagnose specific areas of difficulty should be included in the test. Tests are used to assign grades or to determine the mastery level of the students. These summative tests should cover the whole instructional objectives and content areas of the course. Therefore attention must be given towards this aspect while preparing a test.

PREPARING TEST SPECIFICATIONS

The second important step in the test construction is to prepare the test specifications. In order to be sure that the test will measure a representative sample of the instructional objectives and content areas we must prepare test specifications. So that an elaborate design is neces-sary for test construction. One of the most commonly used devices for this purpose is 'Table of Specification' or 'Blue Print.'

PREPARATION OF TABLE OF SPECIFICATION/BLUE PRINT

Preparation of table of specification is the most important task in the planning stage. It acts, as a guide for the test con-struction. Table of specification or 'Blue Print' is a three dimen-sional chart showing list of instructional objectives, content areas and types of items in its dimensions.

It includes four major steps:

(i) *Determining the weightage to different instructional objectives:* There are vast arrays of instructional objectives. We cannot include all in a single test. In a written test we cannot measure the psychomotor domain and affective domain. We can only measure the cognitive domain. It is also true that all t he subjects do not contain different learning objectives like knowledge, un-derstanding, application and skill in equal proportion. Therefore it must be planned how much weight ago to be given to different instructional objectives. While deciding this we must keep in mind the importance of the particular objective for that subject or chapter.

(ii) *Determining the weightage to different content areas:* The second step in preparing the table of specification is to outline the content area. It indicates the area in which the students are expected to show their performance. It helps to obtain a representative sample of the whole content area. It also prevents repetition or omission of any unit. Now question arises how much weightage should be given to which unit. Some experts say that, it should be decided by the concerned teacher keeping the importance of the chapter in mind.

(iii) *Determining the item types:* The third important step in preparing table of specification is to decide appropriate item types. Items used in the test construction can broadly be divided into two types like objective type items and essay type items. For some instructional purposes, the objective type items are most efficient where as for others the essay questions prove satisfactory.

Appropriate item types should be selected according to the learning outcomes to be measured. For example when the out-come is writing, naming supply type items are useful. If the outcome is identifying a correct answer selection type or recognition type items are useful. So that the teacher must decide and select appropriate item types as per the learning outcomes.

PREPARING THE TEST

After planning preparation is the next important step in the test construction. In this step the test items are constructed in accordance with the table of specification. Each type of test item need special care for construction.

The preparation stage includes the following three functions:

Preparing the Test Items

Preparation of test items is the most important task in the preparation step. Therefore care must be taken in preparing a test item. The following principles help in preparing relevant test items.

1. *Test items must be appropriate for the learning out-come to be measured:* The test items should be so designed that it will measure the performance described in the specific learning outcomes. So that the test items must be in accordance with the performance described in the specific learning outcome.

2. *Test items should measure all types of instructional objectives and the whole content area:* The items in the test should be so prepared that it will cover all the instructional objectives—Knowledge, understanding, thinking skills and match the specific learning outcomes and subject matter content being measured. When the items are constructed on the basis of table of specification the items became relevant.

3. *The test items should be free from ambiguity:* The item should be clear. Inappropriate vocabulary and awkward sentence structure should be avoided. The items should be so worded that all pupils understand the task.

4. *The test items should be of appropriate difficulty level:* The test items should be proper difficulty level, so that it can discriminate properly. If the item is meant for a criterion-refer-enced test its difficulty level should be as per the difficulty level indicated by the statement of specific learning outcome. Therefore if the learning task is easy the test item must be easy and if the learning task is difficult then the test item must be difficult.

In a norm-referenced test the main purpose is to discriminate pupils according to achievement. So that the test should be so designed that there must be a wide spread of test scores. Therefore the items should not be so easy that everyone answers it correctly and also it should not be so difficult that everyone fails to answer it. The items should be of average difficulty level.

5. *The test item must be free from technical errors and irrelevant clues:* Sometimes there are some unintentional clues in the statement of the item which helps the pupil to answer correctly. For example grammatical inconsistencies, verbal associations, extreme words (ever, seldom, always), and mechanical features (correct statement is longer than the incorrect). Therefore while constructing a test item careful step must be taken to avoid most of these clues.

6. *Test items should be free from racial, ethnic and sexual biasness:* The items should be universal in nature. Care must be taken to make a culture fair item. While portraying a role all the facilities of the society should be given equal importance. The terms used in the test item should have an universal meaning to all members of group.

OVERALL TEST CONSTRUCTION

1. Use the test specification matrix to write items that reflect what is taught in the right proportion.

2. Each item should test a concept that is important for the participants to learn in the course. Items should be written around the basic principles of the course, in terms of knowledge or concept and the application of that knowledge.

    (a) Knowledge or concept items tend to reflect definition of essential terms and knowledge of key principles. They require the test taker to recall something important that was discussed in the course or presented in the materials that the participants used.

    (b) Application items are all other types of questions that require evaluation, problem solving, and other types of a higher order thinking.

3. No item should reveal the correct response to another item in the test.

4. Correct responses should not systematically be the same all over, such as "all of the above" or "none of the above." (These response alternatives should be avoided.)

5. Items should include one beginning (stem) followed by 5 response options. To avoid guessing, "I don't know" is always the fifth response option. It is never the correct answer.

6. Items should have an average difficulty level, meaning that you expect less than half of the participants to know the answer before the course and more than half to know it at the end.

STEMS

7. The stem should clearly define the problem with which the item is concerned.
8. The preferred format for a stem is a full interrogative sentence. If the stem is in the form of an incomplete statement, the response options should finish the statement.
9. The stem should include words that otherwise would have to be repeated in each option.
10. The stem should avoid using negatives, particularly if participants do not answer in their native language. If negative words must be used, all letters of the negative words should be capitalized, bolded and/or underlined.
11. The stem should not give cues by using key words that are repeated in the response options.

RESPONSE OPTIONS

12. An item should have one and only one response option that experts would consider correct.
13. Incorrect response options (distractors) should all be plausible. Common misperceptions often make good distractors.
14. Response options should all have the same grammatical structure, include similar terminology and be about the same length.
15. Response options should be arranged in a logical order, wherever appropriate, *e.g.*, when listing numbers. Also "all of the above" should not follow "none of the above."
16. Response options should be arranged in a random or non-systematic order so that the correct answer cannot be guessed because of its place in the sequence of options.

THE TEST FORMAT

After planning the content and cognitive objectives for the test, instructors must decide on the best way to measure them; that is, they decide on the test format. The format refers to whether the test will be objective (multiple choice, true-false, matching, *etc.*) or essay. What factors do faculty consider when deciding on the format of the test?

WHAT IS TO BE MEASURED?

We should choose the format that is most appropriate for measuring the cognitive objectives on the test. If instructors want students to contrast A and B, take a position on an issue and defend it, create a plan, and perform other similar tasks, then they would most likely use an essay format. For example, if an instructor wants students to explain the role of the press in the coming of the Civil War, he/she would probably choose an essay item. But if the objective is

to identify the authors of selected writings about the coming of the war, then the instructor could use an objective type format. Many times instructors have a choice. Objective-type items can be used quite effectively to measure high level cognitive objectives.

A common myth depicts objective items as measuring simple factual recall and essays as evaluating higher-order thinking. But multiple choice items, for example, can be written to measure reasoning, comprehension, application, analysis, and other complex thinking processes. What other factors might influence the decision about format?

THE SIZE OF THE CLASS

Class size is often an important factor influencing the decision about test formal. It is very difficult to give essay tests when there are 400 students in the class because the scoring time is prohibitive.

A survey of 1100 professors from across the country (Cross, 1990) showed that class size is the factor that professors consider most important when they decide what test format to use.

Two-thirds of the faculty surveyed said they preferred the essay format but could not use it because of the size of their classes. They used essay tests only in small classes.

TIME AVAILABLE TO PREPARE AND SCORE TEST

It takes a long time to score an essay test. By contrast, it takes a long time to construct a multiple-choice test. Instructors must consider whether they will have more time available when preparing or when scoring the test. If instructors are short of time when a test must be prepared, then they might choose an essay test, if class size permits. We are not implying that good essay questions are easy to write; essay tests are easier to prepare only because fewer questions have to be written.

ESSAY ITEMS

Let us look at the relative strengths and weaknesses of the essay format.

Strengths of Essay Items

1. Essay items are an effective way to measure higher level cognitive objectives. They are unique in measuring students' ability to select content, organize and integrate it, and present it in logical prose.
2. They are less time-consuming to construct.
3. They have a good effect on students' learning. Students do not memorize facts, but try to get a broad understanding of complex ideas, to see relationships, *etc.*
4. They present a more realistic task to the student. In real life, questions will not be presented in a multiple-choice format, but will require students to organize and communicate their thoughts.

Limitations of Essay Items

1. Because of the time required to answer each question, essay items sample less of the content.
2. They require a long time to read and score.
3. *They are difficult to score objectively and reliably. Research shows that a number of factors can bias the scoring:*
   A. Different scores may be assigned by different readers or by the same reader at different times.
   B. A context effect may operate; an essay preceded by a top quality essay receives lower marks than when preceded by a poor quality essay.
   C. The higher the essay is in the stack of papers, the higher the score assigned.
   D. Papers that have strong answers to items appearing early in the test and weaker answers later will fare better than papers with the weaker answers appearing first.
   E. Scores are influenced by the expectations that the reader has for the student's performance. If the reader has high expectations, a higher score is assigned than if the reader has low expectations. If we have a good impression of the student, we tend to give him/her the benefit of the doubt.
   F. Scores are influenced by quality of handwriting, neatness, spelling, grammar, vocabulary, *etc.*

Writing Good Essay Items

1. Formulate the question so that the task is clearly defined for the student. Use words that "aim" the student to the approach you want them to take. Words like discuss and explain can be ambiguous. If you use "discuss", then give specific instructions as to what points should be discussed. Poor: Discuss Karl Marx's philosophy.
   Better: Compare Marx and Nietzsche in their analysis of the underlying problems of their day in 19th century European society. Clearly stated questions not only make essay tests easier for students to answer, but also make them easier for instructors to score.
2. In order to obtain a broader sampling of course content, use a relatively large number of questions requiring shorter answers (one-half page) rather than just a few questions involving long answers (2-3 pages).
3. Avoid the use of optional questions on an essay test. When students answer different questions, they are actually taking different tests. If there are five essay questions and students are told to answer any three of them, then there are ten different tests possible. It makes if difficult to discriminate between the student who could respond correctly to all five, and the student who could answer only three. Use of optional

questions also affects the reliability of the scoring. If we are going to compare students for scoring purposes, then all students should perform the same tasks. Another problem is that students may not study all the course material if they know they will have a choice among the questions.

4. Indicate for each question the number of points to be earned for a correct response. If time is running short, students may have to choose which questions to answer. They will want to work on the questions that are worth the most points.

5. Avoid writing essay items that only require students to demonstrate certain factual knowledge. Factual knowledge can be measured more efficiently with objective-type items.

CURRICULUM DEVELOPMENT IN EDUCATION

Curriculum development in education is a dynamic process aimed at designing, implementing, and evaluating educational programs that meet the diverse needs of learners and align with educational goals and objectives. It involves a systematic approach to determining what students should learn, how they will learn it, and how their learning will be assessed. Curriculum development begins with a thorough analysis of educational needs, including consideration of student demographics, learning outcomes, and societal expectations. Based on this analysis, curriculum developers identify learning objectives and outcomes, as well as the content, instructional strategies, and assessment methods that will best facilitate student learning and achievement. Collaboration among educators, stakeholders, and communities is essential throughout the curriculum development process to ensure that diverse perspectives and expertise are considered. Curriculum developers also draw upon educational research, pedagogical theories, and best practices to inform their decisions and design curriculum that is evidence-based and responsive to the needs of learners. Once developed, curriculum undergoes implementation and evaluation to assess its effectiveness in achieving desired learning outcomes. Ongoing evaluation and refinement of curriculum are necessary to adapt to changing educational needs, emerging technologies, and advancements in pedagogy. Overall, curriculum development in education is a dynamic and iterative process aimed at providing high-quality education that prepares students for success in a rapidly evolving world. Exploring the intricacies of curriculum development in education, this book offers insights into designing effective learning frameworks tailored to meet diverse educational needs.

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