

EDUCATION THEORY AND PRACTICE

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Preface

"Education Theory and Practice" delves into the intricate relationship between theoretical constructs and their practical applications within the realm of education. In its opening chapters, the book lays the groundwork by exploring the foundational principles of educational theory, elucidating the philosophical underpinnings that shape pedagogical approaches. This foundational understanding serves as a springboard for subsequent discussions on learning theories, ranging from behaviorism to constructivism, which inform educators' strategies in facilitating effective learning experiences.

Following the theoretical framework, the book delves into the practical domain of curriculum design and development. Here, educators are guided through the process of translating theoretical insights into tangible curricular structures that cater to diverse learning needs and objectives. Drawing upon insights from educational psychology, the text also examines the cognitive and emotional dimensions of learning, providing educators with invaluable perspectives on how to foster holistic development among learners.

An integral aspect of educational practice is the assessment and evaluation of learning outcomes. This is explored in detail, with emphasis placed on aligning assessment strategies with educational objectives and employing diverse assessment methods to capture the multifaceted nature of learning. Moreover, the book underscores the importance of feedback and reflection in the assessment process,

highlighting their role in promoting continuous improvement and fostering a culture of lifelong learning. The Theoretical Model of Education delineates a comprehensive framework that integrates pedagogical theories, psychological insights, and socio-cultural perspectives to elucidate the intricate dynamics of the learning process. At its core, this model endeavors to elucidate how individuals acquire knowledge, develop skills, and construct meaning within educational contexts. It draws upon diverse theoretical paradigms, including behaviorism, constructivism, and socio-cultural theory, to provide a multifaceted understanding of learning phenomena. Moreover, the model acknowledges the influence of contextual factors such as cultural background, socio-economic status, and educational environment on learners' experiences and outcomes. By synthesizing theoretical perspectives and empirical research, the Theoretical Model of Education serves as a guiding framework for educators, policymakers, and researchers seeking to enhance educational practices and foster optimal learning outcomes for all learners.

Throughout the book, case studies, practical examples, and reflective exercises are interspersed to bridge the gap between theory and practice. These real-world illustrations offer educators valuable insights into applying theoretical concepts in diverse educational settings, thereby enhancing their pedagogical efficacy and adaptability. By weaving together theoretical frameworks and practical strategies, "Education Theory and Practice" equips educators with the knowledge and tools needed to navigate the complexities of educational practice and promote meaningful learning experiences for all learners.

Education Theory and Practice explores the dynamic interplay between pedagogical principles and real-world application, shaping the landscape of learning.

–Author

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Introduction

ETYMOLOGICAL MEANING OF EDUCATION

The first thing we must do in order to approach our subject is to define its true nature and meaning in clear terms; *i.e.*, to make a terminological specification. It is particularly necessary to do this in the case of education so that we may become aware of the existence of a basic misunderstanding, or confusion that must be eliminated. Education has often been considered as synonymous to “instruction,” *i.e.*, the imparting of knowledge and information. Up until a short time ago and even now) the majority of schools of all levels has aimed, more or less openly, at such a goal, and has intended to carry out such a function. That education, in the true meaning of the word, is something quite different, something that is much more inclusive, and that in a certain sense, even has the opposite meaning!

Instruction means to infuse, to put something in that is lacking, to fill a vacuum. The etymological meaning of the word “education”, however, means to “draw out” (from the Latin “educere”)...to lead, to draw out that which is within; *i.e.*, to bring to light what is hidden, to render actual what is only potential, to develop.

It also means to draw out of conditions that limit; in other words, it is the favouring of a process of growth. Of course, education also includes the imparting of ideas, but this must be seen only as a first step or stage, as an instrument or necessary means, and not as an end in itself. Both aspects and concepts are included in the common usage of the word “education”, and this easily creates confusion and misunderstandings. It would, therefore, be useful to distinguish between them and to always specify, for example, by using the terms “informative education” and “formative education”.

MEANING AND IMPORTANCE OF EDUCATION

MEANING

To know the meaning of education we discuss about it's etymological, narrow and broader meaning of education.

- *Etymological meaning of education:* The term education is derived from Latin word educere, educare, and educatum which means 'to learn', 'to know', and to 'lead out'. That is education means to lead out internal hidden talent of a child or person.
- *Narrow meaning of education:* The education provided under the premises of schools, colleges and universities is the narrow concept of education. The narrow meaning of education limited under the premises of educational institutions. It doesn't include the education outside of four walls of institution. Narrow meaning of education emphasize on bookish knowledge.
- *Broader meaning of education:* Opposite of narrow meaning of education is broader meaning of education. That is the education provided under the educational institution's premises is only education is wrong. According to it's concept education is universal, we can gain education from anywhere, anytime. There is no bound of place and time. Education is the long life process. It starts from cradle and ends to the grave.

THE IMPORTANCE OF EDUCATION

Education is very important for an individual's success in life. Education provides pupils teaching skills that prepare them physically, mentally and socially for the world of work in later life. Education is generally seen as the foundation of society which brings economic wealth, social prosperity and political stability. Higher education helps in maintaining a healthy society which prepares health care professionals, educated health care consumers and maintaining healthy population. Education is major aspect of development of any modern society since if there is a deficit of educated people then society will stops its further progress. Government should pay serious attention to education and support it economically and morally all over the country.

Education is the best investment for the people because well educated people have more opportunities to get a job which gives them satisfaction. Educated individuals enjoy respect among their colleagues and they can effectively contribute to the development of their country and society by inventing new devices and discoveries. Today's ever growing numbers of people mostly are not satisfied with their basic education and try to get secondary or tertiary education in order to meet the demands of contemporary society. Some of them enter higher educational institutions and some search additional information on the internet. Good People sacrifices their time and money and sometimes even their health to raise educational level because they realise that education is their passport to the future and for tomorrow.

Main purpose of education is to educate individuals within society, to prepare and qualify them for work in economy as well as to integrate people into society and teach them values and morals of society. Role of education is means of socializing individuals and to keep society smoothing and remain stable. Education in society prepares youngsters for adulthood so that they may form the next generation of leaders. It will yield strong families and strong communities. Indeed, parents taking an active role in their child education produce a willingness in children to learn. Education and society provides a forum where teachers and scholars all over the world are able to evaluate problems in education and society from a balanced and comparative social and economic perspective. Education is an important aspect of the work of society and it will raise the countryside issues and promote knowledge and understanding of rural communities. One of the education essential tasks is to enable people to understand themselves. Students must be equipped with knowledge and skills which are needed to participate effectively as member of society and contribute towards the development of shared values and common identity. Education has a vital role to play in assisting students to understand their cultural identity. Education acts as the distribution mechanism of the cultural values such as it more layered the society and participate in society that carries the culture.

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Education has a vital role to play in assisting students to understand their cultural identity. Education acts as the distribution mechanism of the cultural values such as it more layered the society and participate in society that carries the culture. In our culture today, there is a great emphasis on higher education. In a society, more educated you are, better off you are.

Every society has specialized individuals that require extended education to fulfill certain main positions. These persons are normally known as professors, priests, doctors, mechanics or artists. Education has been a higher part of every culture on earth and education is a systemic project. Whole society should care for and support the education patriotism, cause and socialism among the young people.

Everyone must do work hard to cultivate moral conduct. Education mainly begins at home; one does not acquire knowledge from a teacher, one can learn and get knowledge from a parent or a family member. In almost all societies, receiving education and attending school is very necessary is one wants to achieve success.

Education is the key to move in the world, seek better jobs and ultimately succeed in life. Schools play a vital role in preparing our children and young people for effective participation and responsible citizenship in society. The development of education and educational opportunities is built on creativity tempered by knowledge and wisdom gain through the experience of learning.

Investment in human capital, life long learning and quality education help in the development of society. Teachers are the most important factors for an innovative society because teachers' knowledge and skills not only enhance the quality and efficiency of education, but also improve the prerequisites of research and innovation. Many members of our society are not provided with a safe and secure environment in which children can develop, child abuse, violence against women and interpersonal violence cause a cancer on our society.

Society play a key role in the realization of life long learning. The improvement of social education facilities such as libraries and the learning opportunities are implemented by the local governments. Students today are exposed to loads of technology and information at everywhere.

AIMS AND OBJECTIVES OF EDUCATION

The importance of aims and objectives of education is recognised by all the educational, professional, political, nonpolitical and religious associations, organisations and groups at various levels in their memoranda, letters and brochures. It is said that education without clear cut aims is like a rudderless ship. The following comparisons emphasise this point fully well. Every pilot has a route-chart and set timing of landing at predetermined destination. There is constitution or set of Principles and traditions through which a country is governed Similarly, there should be properly defined and declared principles, aims and objectives of education or the basis of which policies and programmes of education have to be formulated to achieve the set goals without wasting scarce energies and resources in chasing the wild goose.

It is generally felt that our educational system has not followed the desired aims as a result that it does not produce ideal citizens in the country. It has followed, rather a narrow aim of preparing individuals for livelihood, as mentioned in one of the documents received from an organisation.

The main reason of failure of educational system is that it basically stands on, pre-independence system. The main Objective of its products was how to take degree and to earn money and to be careerist without consideration of ethical values and national spirit. On the other hand, it has also been pointed out that it is unreasonable to criticise educational system alone because it is based on the other subsystems accepted by us.

On the one hand we are developing and cultivating the British given economy, judicial system and system of administration and parliament, and on the other we are decrying and Criticising the education system which merely fulfils the needs of the British systems that we are propagating.

As pointed out in a memorandum of an association, “the main defect of the old. education policy.is that it had completely ignored the Indian culture and the interest of the masses of India and have left them economically too backward and socially too fragmented to articulate their miseries....”

The aims and objectives of education, suggested in the documents, include individual as well as social aims, with emphasis of social transformation aiming at reconstructing society to make it modernised, productive, partidipative, and value oriented nation committed to its constitutional obligations.

INDIVIDUAL DEVELOPMENT

Development of an individual - physically, mentally and spritually is well known aim of education.

Objectives related to this aim of individual development have been expressed in various ways in the memoranda:

- Developing physical and mental faculties
- Acquiring the capacities of understanding, appreciation and expression through word and act, are the fundamental aims of education
- Aim of education should be to make children self- confident and self dependent, and to make them strong physically and mentally
- Education is meant to develop every child’s character, personality and culture and as much knowledge as the child can assimilate not merely memorize.

The best expression of complete development of an individual and the harmonious development of personality, however, is found in the following paragraph. The policy should be directed to the aim of enlightenment of head and heart; illumination of consciousness for allround development of individual personality. Education should enable a human being to attain the greatest possible harmony, internal and external, spiritual and material, for the fullest possible development of human potentialities and capacities.

SOCIAL AND NATIONAL DEVELOPMENT

Social, aim of education in equally important because an individual lives in society and has his obligations towards his nation. There is a realisation that, “The present education system does riot yield required results mainly because it is divorced from the real social content and social goals”.

It has, therefore, been suggested that education should be able, to discharge its natural functions and must correspond to its structure, goals and content in the interest of national development and social progress. It has also been

suggested in this connection that students from young age should be made aware of the social responsibility cast on them. At the same time, there are certain constitutional commitments, which are intimately related to this aim.. We as the citizens of the republic, are constitutionally Committed to democracy, social justice, equality of opportunity, secularism and all to a welfare state. It has, therefore, been suggested that, “Educational policy and educational programme should clearly reflect these commitments”.

The objectives of developing a sense of national identity, unity and patriotism are advocated by many associations. It is pointed out that the national objectives of planning and programmes and development with special emphasis on popular participation and the national problems that we face in different fields should be taught at relevant stages. Individual and social aims of education are not contrary to one another. In fact they are complementary to one another. The following view strikes a balance between individual and social aims of education.

The purpose of education should be the development of the fullest possible capacities and potentialities physical and spiritual of a ‘total man’. It should make a man capable of earning his livelihood reasonably well to enjoy a happy and secure life while making effective contributions to the society and national effort of making India strong# advanced and prosperous.

SOCIAL TRANSFORMATION

Education should not merely equip an individual to adjust with society to its customs and conventions, but it should enable him to bring desirable changes in the society. It has been, therefore, suggested that, “Every educational institution from secondary school to university college should be developed to become an agency of change....”

However, it is essential that we should be quite clear about the purpose of change. It is, therefore, natural to ask the, question, “Reform and change to achieve what”? What type of society we aim at and what type of citizens we wish to produce? The following ideas give an indication of the kind of changes education is expected to bring about.

Modernisation

Modernisation of society in terms of scientific and technological advancement is a view which seems to be quite popular. It is though that education should enable us to move with times and attain excellence in, science and technology. To quote an expression of this kind.

Scientific and technological advances are, gaining momentum and conscious efforts are made to incorporate them into the development sectors. This calls for modernisation of education in order to make, it in conformity with the modern times and to keep pace, with the advances in the world.

Modernisation, however, is not interpreted and equated with westernisation. In fact, lot of emphasis is given to ‘Indianness’ while talking about modernisation. One of the suggestions explicitly points out that, our education should integrate and unite the people of India, modernise society while preserving what is

authentically Indian in our cultural and spiritual heritage”. The following suggestion beautifully reconciles the twin objectives of modern technical sophistication and the ancient spirituality.

“New education policy of India should be built on the foundation of ancient spirituality and modern culture and technical sophistication. It should develop scientific temper and spirit of enquiry in the students”.

Productivity

Some documents have insisted on linking education with productivity and thus making individuals as productive citizens to build a productive society. One of the suggestions, in a memorandum, for example, says. “It should bring about a social transformation, and enhance greater efficiency and productivity in all sectors: agri- cultural, industrial and service”. It is in this context that Mahatma Gandhi’s system of basic education is still considered as a basically sound system and a suggestion has been made that with necessary modification elements of basic education may form part of education not only at the primary stage but at all stages in our national system of education.

These elements are:

- Productive activity in education.
- Correlation of the curriculum with productive activity and physical and social environment.
- Intimate contact between the school and the local community.

Community Participation

In a democracy education without community participation is barren. This aim of education is, therefore voiced by a number of groups and organisations. The change that is envisaged on this front is that of Integrating education with community in all respects. To quote a suggestion in this regard:

The education system in all its branches and sectors should get itself involved in activities related to problems of local Community life and shall thus endeavour through the desirable community participation community involvement in the educational field to bring all education of its rightful place in community life.

ACQUISITION OF VALUES

Moral, cultural and spiritual values in education have been given immense importance in the Memoranda documents. One of the expressions emphatically point out that, “certain basic values as respect for others, responsibility, solidarity, creativity and integrity must be fostered in our children”.

It is interesting that a number of specific values have been suggested in the documents. Emphasis should be given in cultivating good qualities like cooperation, good will, forgiveness, tolerance, honesty, patience, *etc.* in order to encourage universal brother-hood and to prepare students worthy citizens of the country. Values of optimism and secularism, and service to the poor should be stressed on the young minds.

SUMMING UP

It is worth reproducing what a document mentions about the aims of education:

The aim of education is two-fold:

1. Development of the individual in society and
2. Consequent development of the society.

The aim of education in relation to individual may be spelt out as follows:

- To produce full human personality with courage, conviction, vitality, sensitivity and intelligence so that men and women may life in harmony with the universe;
- To bring out the fullest potential of child and prepare him. for life and its varied situations so that he becomes a cultured and responsible citizen dedicated in the service of community.

In relation to the society, the aim of education is to create:

- A sane and learning society where made of material production will be such that no part of the society remains unemployed. In the Indian context such a made of production will be necessarily based on a decentralised economy utilising all available manpower;
- A society. where the conditions of work and general environment will offer psychic satisfactions and effective motivations to its members.
- A society reconciling technological and scientific advancement with general well-being and securit of its members, enhancing joy of life and eliminating all forms of exploitation.

The broad objective of education should, therefore, be to look beyond the existing society and to develop men and. women amenable to the advent of a sane and healthier society of tomorrow. While summing up, it may be pointed out that various dimensions individual and social development, social transformation, value- acquisition *etc.*, have been well identified in the memoranda documents. The following words briefly summarise the various dimensions which are considered important indeed for marching into the 21st century:

We are of the opinion that Indian education should aim at producing men and women of knowledge, character and cultural values and trained skills to achieve excellence in their career and life. Let us make it clear that we wish to prepare youth to march into the 21st century on the ideals of truth and non-voilence as shown to us by our great leaders.

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Educational Administration

Objectives of Education: The goals of education can be formulated only in the light of the needs of society for which the education is meant. Education constitutes the curriculum and the teaching techniques, or in simple words—‘what we teach and how we teach’. Difference in social and political institutions will determine different purposes of education. The ends of education will be different with totalitarian, theocratic and democratic societies., Totalitarian governments use schools and colleges as they use all other institutions to create tools of the state rather than free citizens. George S. Count and Nucia P.

Lodge through translation of Russian writings revealed that the purpose of the elementary schools under Stalin was to promote love of the motherland, reverence for Stalin and hatred for enemies of both. In a free society the general purpose of schooling is to prepare the young for participation in a life of citizenship in which all may share equally—for duties and responsibilities of Self Government.

The value structures of society with agricultural bias will be different from those depending on industrial economies. To make education really meaningful the ends of education will change from rural to urban societies and vice-versa. The requirements of an industrial economy will significantly differ from those of an agricultural economy; likewise the goals of education with a rural bias will vary from those of urban bias.

The end values to be sought through education must be, therefore, identified, elaborated and given operational meaning by reference to social conditions and personal experiences, to the efforts and designs of society and to the aims, needs, and aspirations of those who are to be educated.

Ours is a democratic society with a mixed economy. Our education should lead to the liberation of the mind and the training of the hand, heart and the

head.

Long Term Objectives

From the times of ancient Greece to the present day the goals of higher education have been defined as generating a critical consciousness and analysis rather than the preservation of the *status-quo*; and building up an integrated personality, preparation for life and the cultivation of highest intellectual, ethical and spiritual values in the individual consciousness. In a democratic society education is directed primarily to the individual—the basic assumption being that the good of the society and culture is coincident with that of the individual. Plato quotes Socrates as saying “and we shall begin by educating the mind and character, shall we not”. Mr. Faure the Chairman of the International Education Commission (1970) states in *Learning To Be*: “The physical, intellectual, emotional and ethical integration of the individual into a complete man is a broad definition or the fundamental aim of education.”

Pandit Jawahar Lal Nehru, the first Prime Minister of India while addressing a convocation at Allahabad University in December 1947 said, “A university stands for humanism, for tolerance, for reason, for the adventure of ideas and for the search of truth. It stands for the onward march of the human race towards even higher objectives. If the universities discharge their duty adequately then it is well with the nation and the people.”

It is true that higher education is not worth the while unless it trains the students to think rationally and fearlessly and to appreciate moral and cultural values. But in a developing society like ours the pursuit of knowledge and the acquisition of skills must go together. The fullness of life would not be achieved unless the intellect, mind and the hand work in unison. It has often been observed that a technocrat is not intelligible to a man with liberal values and *vice versa*. Sometimes they may be geniuses in their own field of studies/work but still they cannot communicate to each other. Practice of many advanced technological institutions supports the belief that technological courses are enriched by association with the study of human values. The report on standards of university education brought out by the University Grants Commission, New Delhi, recommends that the Indian Universities in the present situation must lay stress on development-oriented education. But it also gives a word of caution that “in doing so we have to take care that the personality of the students as cultured and responsible members of society and as constructive citizens of the state is not lost sight of.”

In simple words it may be said that our goals of college education should be so shaped that the future citizen of India is physically, intellectually and mentally a sound individual able to contribute to the building of a free democratic and self-sufficient India and so equipped as to help his motherland to play an appropriate role in the modern world order.

Short Term Objectives

If the long range purposes of education as discussed above are to be achieved we must set immediate goals which could in due course of time help us, in attaining the long range ends of education. Sterling M-Currin placed the cognitive goal, the affective goal and the conative or volitional goal as the basis of education at the school level. In fact these three goals are intimately interrelated, interdependent and often synonymous, one helping the other. Although 'cognition' is readily distinguishable from 'affective' and 'conation' yet in the actual flow of mental life the three types of experiences are found together but one of them is usually predominant in one total experience and this in fact facilitates their mutual discrimination.

The cognitive goal of instruction is:

- (a) Acquisition and communication of knowledge.
- (b) Cultivating reasoning leading to judgement and problem solution.

Acquisition of knowledge and its application in the day to day life activities is the first element of education. It is not a collection of certain information or facts in a mechanical way.

It has been agreed on all hands that at the school level the great bulk of learning is memorising of facts, rules, principles and methods. It is true that some basic information is necessary about an area in order to work in and to be able to acquire the understanding of the basic concepts of the area. For example, the memorisation of the elementary, multiplication tables in arithmetic is a 'must' at the earlier stages but this memory work must lead to addition, subtraction, multiplication and division and later on to further complicated theories.

Unfortunately either we dispense with the memory work altogether fearing that it is dubbed as a mechanical teaching or carry it too far. The result is that till the graduate level most of the students are only plodders depending more on thumb-rule methods. The students should, therefore, at the school stage learn not only the facts and the information but be able to acquire mental abilities and skills which enable them to think and discover more relevant facts for themselves.

Cognitive learning equips the students with knowledge and reasoning and the ability to apply this knowledge to meet the various situations of life. The goal is to make the students to learn to "think like a scientist". Knowing is a process and not a product end.

The college education should provide information or knowledge but knowing a certain thing is not enough. The controlling factor is the will to do. The mastery of the cognitive learning presumes that a student can do what is required of him in a certain situation but it is the 'affective' learning that will determine how he reacts to that situation—that will depend upon his feelings and values. Therefore, the second immediate goal of education is the "disciplining of an individual's"

emotions and passions; his aesthetic, moral and spiritual sensibilities, his basic feelings, sympathy and appreciation—whatever constitutes what is commonly called the inner life or the life of sentiment and feelings. The acquisition of this discipline is important for moral education as well as for education in the arts.

‘Knowledge’ and the ‘will’ are a great asset but ‘action’ is the most important of all. The dogged pursuit to achieve an end is the real thing. Unless one can take a decision to plunge to achieve his target, all the knowledge about it or the desire to achieve it may not be very fruitful. Therefore, to prepare youngmen and women for the larger goals or the long range ends of education as enunciated by great educators of east and west from times immemorial, we must make a start to equip them with knowledge, discipline their minds and to nurture them to act.

The achievement of the goals will depend upon the system of education, curricula, instructional instruments, techniques of instruction and the teaching personnel. It may not be within the power of the administrators or the teachers at the school, college or even the university level to determine the pattern of education. A variety of circumstances and needs of the country go into formulating a certain system of education. But curricula are prepared by the topnotchers in the field of education. They, by and large, frame these curricula in collaboration with the experts on various subjects. This involvement of teachers could be more broad based so that the curricula so developed support the goals to be achieved.

Even if the determining of the system of education and the formulation of the curricula is not within the reach of every teacher, another important means of achieving the ends of education is certainly within the power of every teacher and this is the ‘teaching strategies’. Within the given framework of curricula he can employ means which can help in cultivating in his wards ‘cognitive’, ‘affective’ and ‘volitional’ learnings. It is what the teacher does with these materials (curricula) that determines as to what kind of learning occurs. He can convert the subject matter to mere memory exercises or he can build up creative behaviours one upon the other till the most complex one is attained.

College/University Environment: Environment denotes the sum of factors—external to human beings, animals and plants, which act upon them. Organisms live by exchanging matter and energy with their environment; the structure and activities of living things result from interaction between their heredity and environments. The response of the organism, to its environments determines its development and growth and its maintenance by continuous adjustment to the environment.

When we speak of the college or university environments we may mean the ethos that permeates the institution and leaves an indelible impact on the students, the teachers and the other workers in the college. This atmosphere of the college is something intangible, difficult to define though it can be illustrated and explained by its results. Have we not heard of the great universities and the colleges which are known for the spirit whose presence could be felt in every particle of them? This spirit of the institution gives an individuality or specific character to the institution. Tagore’s Shantiniketan was one such place where one could see the environment of harmony between man himself and nature’s role in the building up of a complete man.

The author had the good luck to get education in an institution where there was an atmosphere of service, tolerance and moral character. This was visible from every nook of the college. He can recall how parents from far off places sent their children to the institution because of its healthy environment—the environment of character building—even when they had big institutions in their own towns. Mother Teresa the winner of the Nobel Peace Prize became an embodiment of love for the poor because of the atmosphere she breathed in.

An individual's personality is not his size, sex, residence, his relations and income but his aptitude, interests, values, social and emotional maturity; similarly the size, the courses provided, even the university pass percentage of a college do not determine the nature of the college. College is really what its climate is or what its personality and character are. A university or a college may have the atmosphere of fear and policing and suffocation while another seat of learning may provide academic freedom, a desire to grow and to extend the frontiers of knowledge. The latter type of institution—whether a college or university—may have less resources and less prestigious buildings but it will produce men and women who will be the real resources of society.

There are a number of factors which contribute to an institution's environment. We shall discuss here only a few significant ones:

- (i) Scholarship
 - (ii) Awareness
 - (iii) Community Life
 - (iv) Physical Education
 - (v) Moral Education
 - (vi) Vocational Education/Work Experience.
- (i) The scholarship dimension of a college or university emphasises the academic achievement. How far the teachers are allowed academic freedom or intellectual liberty will determine the academic environment of the college. Academic freedom embraces freedom in teaching and freedom in learning or 'lehrfreiheit and lernfreiheit' in the language of Germany where the modern concepts of academic freedom took form in the 19th century. It also includes certain personal freedoms to the teachers in relation to their conduct outside of their institution which are deemed essential to faculty members and students such as: absence of restraints, penalties and intimidation regarding his studies and inquiries, presentation of his views and the publication of his findings. Freedom to the teachers and to the students to learn is not a matter of framing a set of rules but of creating an atmosphere where both feel free. It is not a justiciable right but comes spontaneously in a congenial and healthy academic environment. Unfortunately academic freedom has no roots in the Indian culture. Neither in the tradition of ancient India nor in the recent colonial tradition can any base be found for academic freedom. The very attitude to knowledge in the ancient period was such as to inhibit freedom of inquiry which is the very substance of academic freedom. Education was transmission of revealed knowledge from the 'guru to the shishya' to be accepted unquestioningly with all reverence. Even under the British the same 'taboo' continued.

The students, by and large, do not have the courage to discuss or to question the validity or the reliability of the facts or the information supplied to them in a spirit of “his master’s voice” by the teacher. The teachers and the students work with their attention focused on examinations only. Consequently the potential of the students remains untapped and dormant. Even the toppers are found to be hack workers without developing the power of critical thinking. It is where this atmosphere of free discussion and questioning obtains that we have the environment of scholarship.

- (ii) The second important element or dimension of the environment is awareness. It warrants that an environment should foster both social and aesthetic sensibility; social sensibility implies living interest in the society of which one is a part—in other words, it implies a study of its problems and its aspirations. Aesthetic sensibility implies an interest in art and beauty. Aware students are actively concerned with national and international affairs also.

The present system of education is responsible for increasing the gulf between the educated and the uneducated classes, between the intelligentsia and the masses. Our teachers and students as a whole with a few exceptions, therefore, become a parasitical group living for itself and not caring for the common good. The University Education Commission (1948) and the Kothari Education Commission (1964-66) have recommended that social and national services should be made an integral part of education at all stages, and that this programme should run concurrently with academic studies in schools and colleges. In order to develop aesthetic tastes and values, there should be a provision of activities for creative expression. Adequate facilities should exist for music, dramas, dances, *etc.* This will make not only the college environment richer and healthier but will also add ‘fineness’ to the lives of the students.

In order to inculcate these values through schools and colleges we should draw not only upon our national traditions and sources but also learn from the culture of other countries. A major weakness of the Indian and particularly of the Hindu society has been a lack of equality and social justice, which has given rise to the caste-system. We must, therefore, draw upon the liberalising force that has arisen in the western nations and which has emphasised among other things, the dignity of individual equality and social justice. An understanding of the national and international contributions in these fields is of a great significance. There are programmes of international understanding and pen-friendship in some selected schools in our country. Their scope could also be extended to the colleges. This will make them feel that they are citizens of the whole world. While taking physical, mental and cultural nourishment from our own national environment we should imbibe the spirit of broad internationalism, based on an abiding faith in the brotherhood of man, a keen appreciation of the common heritage

of mankind in the various fields of culture and a deep sense of interdependence of men and women all the world over.

To develop this national and international awareness and to instil social and aesthetic sensibility we can tailor our courses and orient our techniques of teaching accordingly. Eminent persons of national and international fame can be invited to the colleges and the universities for lectures and discussions. Musical concerts, painting competitions, 'mushairas' *etc.*, can be arranged on national/international basis with a great benefit to the students, the teachers and the society at large.

- (iii) Community dimension indicates a friendly, supportive and sympathetic environment and a sense of group welfare and loyalty. When there is community spirit the college has a reputation for being friendly; students commonly share their problems; professors go out of their way to be helpful. The author is Personally aware of such an atmosphere in a college. The fellow students and teachers, there would attend upon the sick hostelers by turns. The parents in some cases felt that they could not have looked after their children so well at home, the way they were cared for at the college by the students and the teachers. Service of the sick and help to the needy had become a sort of tradition in the college. The Principal and his wife would cook food for the sick hostelers when there were no servants available.

In this context the Kothari Education Report has recommended that every educational institution should develop a rich community life of its own and provide adequate and satisfying opportunities to participate in it and to help in organising it. Instead of using servants and hired labour in hostels in particular, it is possible to have much of the work done by the students. This will provide a useful experience of self-help, togetherness, manual labour and altruism to the students. This will yield excellent educational results—as was the case in many old ashrams and academies. Japan has followed this practice as her national system. No menial servants are employed in any educational institution excepting only when skilled labour is required.

- (iv) Physical education is another important environmental dimension. "Sound mind in a sound body" goes the adage. A healthy body is the sine-qua-non of the harmonious development of a person. Physical education not only gives physical fitness but also emphasises on numerous educational values. Though good sportsmen and athletes start taking shape in their school days, it is at the college stage that they develop their potential to grow into good sportsmen and athletes, racers and mountaineers. Only such persons bring laurels to their institutions and their country.

Physical education should be for all. Games should be available to all, though the students who have special talents for sports should be intensively groomed, so that they may display their mettle in this field. An institution which ignores the importance of physical education does it at a great loss to its own reputation and a peril to the nation. In fact

physical education contributes not only to physical fitness but also to physical efficiency, mental alertness and the development of qualities like team spirit, perseverance, leadership and obedience to rules.

- (v) *Moral Education*: Research studies which have been conducted in the sphere of college students show that substantial personality changes take place in the youth during their stay of three to four years in college. Their attitudes, values and interests are significantly influenced by the environment of the college. A college should, therefore, create a climate of values that will give more positive direction to students.

The students should be exposed to the best and the highest influences, to the noblest in literature, philosophy and religion. It should awaken and deepen an appreciation of spiritual, moral and ethical values in the students. Education with a lack of values may prove dangerous. Unfortunately there is a sad decline in the moral standards of our youth which needs to be arrested.

The college may start with a prayer. A few selected passages from the scriptures may be read out to the students and their substances explained. The Kothari Commission has recommended that some periods a week may be set apart for the inculcation of social, moral, ethical and spiritual values. These periods should be taken not by specially recruited teachers but by general teachers, preferably from different communities. Only such teachers should take up these periods who can preach by their own examples rather than through precepts. They themselves should be convinced of the importance of these values and should be willing to devote time and effort to it.

We should take care that this should not lead to indoctrination. The values that we want to instil in the students and the teachers should be such as are their own values. They should not feel that any ethical, spiritual or moral values are being imposed upon them. Ethics or values devised or held by someone else or acquired through words without personal involvement may not have impact on the students or the teachers.

- (vi) *Vocational Education/Work Experience*: Indian education has been liberal or general throughout inspite of the recommendations of numerous education commissions and committees. The result is that our collegiate young men and women get alienated from their parents' vocations just because that may involve manual labour. General education equips them for the soft jobs, which are not easily available in proportion to the job seekers. Hence they find frustration writ on the wall, as white collar jobs become hard to find and for hard (manual) jobs they are unfit. "The vast majority of its potential beneficiaries see it (general education) as remote because it teaches them nothing of use, hostile because it seeks to take them away from their work and prevent them from scratching out a living." The present set-up of education is, on this account, very much decried in the press and on the platform.

India has set before herself the task of improving the lot of the people by creating a modern and technological society. An infrastructure has already been created and the country is on the threshold of major technological revolution. The latest achievement of the Indian space/engineers is the successful space odyssey by Squ. Ldr. Rakesh Sharma in Soyuzt-II in April 1984. This not only creates demand for highly skilled technicians but also requires average citizens to be self-supporting and self-generating in their competence and attitude. It, therefore, becomes essential that every citizen should equip himself/herself with a productive/creative work. Kothari Education Commission's Report (1964-66) has suggested that too sharp a distinction must not be drawn between general and technical education. General education should introduce the students to the world of work and to an understanding of science and technology.

This aspect must be particularly stressed in a developing society like ours. Knowledge must have some practical use. Knowledge and the acquisition of skills must go together. Even the medieval universities in a way combined liberal education with professional training. It is a happy augury that Indian universities have started giving importance to the socially useful productive work along with the general education. The NSS work, the adult education programmes, social service activities at many occasions are being organised in most of the colleges. Besides developing in the students and the teachers, a cooperative attitude and a habit of hard work and desirable traits of character, these social activities are a big step towards lessening the differences between town and country, between mental and manual labour—an important principle of socialism.

Extent of Educational Administration: Scope of educational administration is as vast as that of education itself. Any activity conducive to the achievement of educational goals, is a part of educational administration. Such activities could be—at the college level, at the state department level, at the university level or at the central level. We have discussed in the earlier part of the book the long range and the immediate goals of education. Administration exists to bring these targets as near the students, the teachers and others as possible. Therefore, anything done to improve the quality of education at any stage—may be ranging from the supply of physical needs to the highest cultural or academic needs—comes under the area of educational administration.. Here we shall consider only the scope of administration at the college level. The role of the college Principal at the local level can be studied under the following heads:

- (a) The college plant should be operated in the best possible manner and it be ensured that it remains in an excellent state. The laboratories, classrooms, the library and the reading room should get proper attention of the administrator. The proper upkeep of the sanitary conveniences is a 'must'. Unfortunately this is the most neglected section of the college. Funds if possible may be provided for the extension of the buildings wherever necessary (of course taking care that every inch of space is properly utilised and to the maximum). But provision of funds for the repairs and the upkeep of the plant is essential. The hostels, playgrounds, classrooms and laboratories should be suitably and adequately equipped.

- (b) On the proper selection of teachers depends the smooth working of the institution. A single undesirable person can vitiate the entire atmosphere of the college. It is true that the selection of the teaching staff is made by committees specially constituted by the respective universities but the chief onus of running the institution lies on the college Principal. Therefore, his voice should be given proper weightage in the selection of the teachers.
- (c) The teacher faculty should be provided necessary academic freedom, besides proper conditions. The administrator should see that there is no unnecessary encroachment on their academic rights and personal liberty. In most colleges, teachers work in fear and resentment of the Principal. This leads to an unwholesome atmosphere. Every college should have a teachers' council and the staff members may be free to express their views sincerely, honestly and fearlessly. Code of conduct for the teachers and the students should be drawn up and the schedule for their direction, guidelines and supervision should be framed in consultation with the teachers and students.
- Continuing education programmes should be a regular feature of the college. UGC has numerous schemes for the development of the teaching faculties. The college administrator should keep abreast—of all such programmes and enthrust staff members to avail of such opportunities. The college teacher's chief function is to be aware of the latest in his subject—by reading and research into new aspects, meeting and corresponding with other specialists, attending conferences and travel. He is expected to transmit to the students not merely the dry bones of well-accepted knowledge but the living and the growing body of his experience. For this, all-out efforts should be made by the college administrators.
- (d) Curriculum: The educational administrator can, in a large measure influence the curriculum construction in the colleges. The academic bodies or the boards of studies while framing the academic courses should keep in view the social, aesthetic and technological changes that are taking place around us. A periodical evaluation of these courses will help us in upgrading them and keeping them trim to meet the needs of the society. We witness so much of trouble and unrest in our campuses because the curriculum that we offer to the students does not meet their aspirations.
- Administration has also to pay close attention to the co-curricular and extracurricular activities. Students learn more through informal and non-formal ways than from the institutional programmes. Their peers sometimes leave a more indelible and specific impact on them. Provision should be made for as many games, sports, and athletics clubs *etc.*, as possible. Important pupil services should be organised for the benefit of the students.
- (e) Finance is an important area which includes problems of income and expenditure and their accounting and auditing. A successful

administrator must keep himself intimately in touch with the financial position of the organisation he is responsible for. He must know the possible—sources of income and the items of expenditure under various heads. Whenever there is a deficit which cannot be met, the institution is in a danger-zone. This is the time for the administrator to think of new resources may be levies, donations, *etc.* (while suggesting these sources the author has the private enterprise in mind)—on the one hand and of plugging the leakage wherever possible on the other.

Over-budgeting will land the administrator into difficulties. He should guard himself against this. The author is personally aware of a number of educational administrators who got into serious trouble for being careless in financial matters and not checking up if the fees and funds received were properly accounted for.

Besides looking to these areas the administrator has to care for various other aspects of an emergent nature. For instance the calamities that befall the country are to be combated. The students and the teachers should be prepared to face these and to extend all possible help to the sufferers irrespective of caste, creed or provincialism. At the time of war, training for air-raid precautions, control of traffic routes and other odd jobs which can be safely and suitably performed by the students come under the scope of college administration.

Constituents of Educational Administration: Planning means to think before acting and to act according to facts and not on conjectures or speculation. According to the Oxford English Dictionary planning is “to design some action to be done, before hand”.

There cannot be two opinions on the importance and need of planning in every walk of life. In our ordinary day to day life we have to plan our activities. If we have to undertake a journey, we have to plan on various issues. Without planning there can be very little intelligent direction of activity. It is through planning that goals of an organisation and institution can be achieved. Planning is very essential in industry, in commerce and in military affairs. Production of goods and their marketing cannot be done without thinking in advance in the light of the obtaining situations. Wars cannot be won without properly planning the alternative strategies of invasion, keeping the resources of our own and of the enemies in view. This we can ignore only at our peril.

Educational planning is also to explore the best possible means to achieve our objectives. With the wide scope of educational administration, particularly at the operational end, much cannot be achieved without advance thinking. In the matter of higher education planning is done at the national level, state level, university level and at the college level.

According to the Education Commission (1964-66) planning at the first two stages, *i.e.*, national level and state level alone suffers from some deficiencies such as: (i) lack of emphasis on local issues in educational development, (ii) non-involvement of the educational workers, (iii) over emphasis on expenditure oriented programme. Planning at the local level, *i.e.*, college level is the only offset to these drawbacks. Planning at the college level does not mean that the Principal or a few of the members of the faculty prepare the plan for various activities of the college. Instead it is a cooperative endeavour of all those who

are involved in the implementation of the plans. Not only the members of the faculty, teaching and non-teaching, but even the students, the parents and the local communities must be associated while planning out the programmes.

The scope of the college plan may be spelt out as under.

- (i) Improvement of physical facilities.
- (ii) Improvement of teachers and of library services.
- (iii) Improvement of co-curricular and extracurricular activities.
- (iv) Participation in community programmes, *etc.*

The basic principles to draw up these plans are as follows:

- (i) The plans may not be grandiose but such as can be achieved with the resources in men and material available with the institution.
- (ii) The resources should be utilised to the maximum. It has been found, for instance, that the playgrounds or some classrooms or halls are used only for a very short period in the year. Attempts should be made to put them to the greatest use—may be even for community activities or for inter-college or school complex activities.
- (iii) The immediate needs of the institutions should be identified and priorities determined and accordingly the plans be prepared.
- (iv) As far as possible no financial implications be involved in implementation of these plans. If we tie our plans with certain pre-requisites or with more funds, we are not likely to succeed.
- (v) Plans could be of long range or of short range. But a periodical assessment of either type of plan is a 'must' in order to achieve something tangible.

EDUCATIONAL ADMINISTRATION AND GENERAL ADMINISTRATION

It is being argued that "all administration is the same. Whether one looks at administration from the standpoint of its purpose, its task, its situational milieu or its process, he will find much that is common in the management of Business, Government, Army, Education and other organisations."

Those who see no significant difference between the two say that human behaviour, cult of efficiency and bureaucracy are common to all administration. Educational administration includes most of the general administrative functions such as appraisal of the organisational purposes and coordination of all the forces—staffing, training, public relations, community service, raising funds for institutions, maintenance of accounts and a score of other things to achieve the objectives. On this account they say that educational administration very well fits into the pattern of administration in general.

- (1) Despite the common elements, there are differences at least in degree between the administrative processes related to various social organisations and educational institutions. Educational administration is a "non-profit making enterprise". It is chiefly welfare or service oriented. The purpose of an industrial administration is to produce goods, of course, to meet the needs of the people but their motive is to make profits. No worthwhile business administration can run even on 'no profit, no loss' basis whereas

educational administration worth the name aims at the development of human personality without caring for the monetary losses. In fact, educational enterprise is a “welfare enterprise” first and last and more often than not runs in financial losses which—are met by donations, public contribution or by levies or taxes, *etc.*

- (2) Peculiarities of educational administration arise from the objectives of education in our society. Education is closely linked to life. It needs to be transferred into a powerful instrument of social change. National development can be brought about only through universal education. Even the survival of a democratic society is possible through education. “Destiny of India is now being shaped in her classrooms.” This, we believe is no mere rhetoric. In a world based on science and technology it is education that determines the level of prosperity, welfare and security of the people. On the quality and number of persons coming out of our schools and colleges will depend our success in the great enterprise of our national reconstruction; whose principal objective is to raise the standard of living of our people.—Indian Education Commission (1964-66).
- (3) Good educational institutions free men to rise to the level of their natural abilities. Hope for personal advancement and the advancement of one’s children is, of course, one of great wellsprings of human energy. The schools and colleges only sustain this hope. Public education has an inbuilt corrective of our society. Only through general public education can we succeed as the largest democracy of the world. The educational administrators have, therefore, a special responsibility.
- (4) Education deals with people directly and intimately. “The most intimate relationship the school/college has, is with children and youth. The pupils represent the dearest possessions of their parents and these parents, by and large, are greatly concerned with how the school/college is treating their offspring. In other words, the school/college is confronted with the emotional attachment of parents to their children and these attachments are much stronger than those which most parents have for other public or private services.” The educational administrator is thus concerned with a group of clients who may not be his by choice. But without whose cooperation the institution, he is responsible for, cannot function properly.
- (5) The main concern of educational administration being, people and their welfare, the techniques of educational administration are mostly persuasive while those in other kinds of administration are mostly coercive, dictatorial and authoritative. An educational administrator

has to look to the interaction of the persons involved, whereas in other types of administration one can afford to ignore the reactions of the persons affected by his decisions—though sometimes he too has to pay through the nose for the neglect.

- (6) Another special feature of the educational enterprise is the nature of the learning process. Learning is a complicated affair. It comes more from informal situations than from the class room lessons. Much informal education goes on without any body's intending to learn—simply as a process of social interaction. Much of what a pupil learns is learnt as a consequence of social interaction among pupils. Thus learning is preceded by a number of factors. It does not merely mean acquiring some knowledge or understanding but it may provoke many emotional commitments. Shaheed-i-Azam Bhagat Singh who shook the foundations of the British Empire, Subhash Chandra Bose who alienated the heavenly born Indian Civil Service and Lala Lajpat Rai, the “Lion of the Punjab”, achieved more than learning in their school and college days.

The channels of contact and communication have to be always kept open and free with the teachers, the students and their parents. The educational administrator has to be highly visible and accessible to the public in general too as the educational institutions are the public affair.

- (7) Evaluation of results in education is another area which poses special problems to educational administrators. In business, one can use sales of production or the profits as evaluative measures. In the military, objectives are definite and it is not difficult to assess whether these goals have been achieved or not. Likewise the targets of the town architects and dam builders can be measured to a large extent as these are more or less concrete. But it is not so in the case of educational objectives and targets. The “purpose of all education at all levels varies from literacy to critical thinking, intellectual leisure and facilitation of social mobility.” Literacy could of course be taken as something tangible, *i.e.*, reading, writing and numeration but critical thinking, intellectual leisure or facilitation of social mobility may almost mean anything to anybody. To say, therefore, about any institution as to how far these abstract goals have been achieved is difficult if not impossible. People may disagree even on their interpretations.
- (8) Educational administration is different from other types of administrations in one more way—that is staffing. The teaching staff of a college is more or less equally qualified. All of them hold post-graduate degrees if not Ph.D. or M.Phil degrees and generally with peer merit. Many members of the staff may even be better trained and experienced than the principal. They may have even more of research work and teaching merit to their credit. The educational administrator is thus working with professionals who feel, and often rightly that they know more about teaching and learning than he does.

Gatzels and Cuba have pointed out that professional trained people, in contrast to day labourers or skilled people or production workers, are more inclined towards 'idiographic' than 'nomothetic' behaviour. A college organisation as contrasted to any business enterprise is more persuasive and idiographic. In other words, the training of teachers and the institutional settings in which the teachers work produce behaviour which stresses personality-factors more than role-factors.

- (9) Authority, of course, serves as fuel on which all formal organisations are run. But authority is far more sophisticated than simple "command and obey" situation or relationship and the role of authority in the academic organisation is even more discreet than it is in other enterprises. The zone of acceptance in the case of an academic faculty is much narrower than in other enterprises.
- (10) We often find that the governing bodies or the boards of control of educational institutes know very little about the complexities of learning and teaching. The unfortunate part of the whole situation is that they sit in judgment on the educational programmes they do not fully understand. But this thing seldom happens in other organisations. The manager of a firm or a factory works for a board most of whom are thoroughly familiar with the factory affairs, its organisation and objectives.
- (11) Lastly the educational administrator in a college has to perform two major functions. Firstly, he is principal of the college, and secondly, he needs to continuously reshape his organisation. The principal of a college has not only to be an administrator but an educational statesman too. He has to achieve the immediate objectives of the organisation and also to plan the long-range development and growth of the institution. He is not only to implement the educational policies framed by the powers that be, but is expected to suggest the changes in the policies. A general administrator is bound to plan and operate a programme designed to implement certain policies. He has to work within the given steel framework. If he ever trespasses the framework, he has to pay the price for it; whereas an educational administrator who is worth his salt spearheads new tracks. He may be, even ploughing a lonely furrow.

Retrospect

Education is a part and parcel of civilization. If civilization and culture of a race are to be preserved, it can be done so through transmission and making new contributions. In the earlier days, the traditions, customs and practices were passed from one generation to another by word of mouth. The priests, 'rishis' and seers committed the scriptures to memory and imparted their knowledge to their wards and to those who came to seek such knowledge. Such single-teacher schools with one or two pupils or more in the earlier times were called gurukuls. They were of numerous varieties: some were with one or two

pupils, others with larger numbers but not exceeding twenty five. But one thing common in these schools was that they were all free schools and were supported by the gifts of philanthropists. Huen Tsiang and I-Tsiang the Chinese travellers who visited the country in the 7th/8th century A.D. have given an account of the Nalanda University—at the site of present Magadh. Nalanda University was born of the liberal endowments created by the people and the emperor of Magadh and the neighbouring emperors.

The teachers and the students were made fully independent of all economic worries. But the state or the people had no control on this seat of learning. It was the Chancellor or 'Acharya' who was the chief person to be looked to. Of course, he was the greatest authority of his subject 'Yoga'. The external administration such as the management of the estates attached to the University was with a sub-committee formed out of the local population. In the course of time this ancient education suffered from many onslaughts. The unkindest cut came from the Muslim invaders. The result, in the words of Education Commission of 1882 was, that these gurukuls or the tolls (as the bigger gurukuls were called) *etc.*, either died or barely managed to survive.

Before the advent of Muslims in India, education was exclusively a private enterprise. The kings and rulers did donate liberal grants to the educational institutions but never opened educational institutes under their own management. But after 1000 A.D. we find that a number of state schools and state colleges were established under the state control also. Unfortunately no documents are available regarding the detailed administration of these state institutions.

It is worthwhile to note that the state had nothing to do with the day to day work of these indigenous schools. They were supported by the people from religious motives. Instances exist when the state government too endowed funds to institutions of higher learning and supported the cause of education in indirect ways only, *i.e.*, by the offer of scholarships to students, organising literary symposia and giving awards to learned scholars.

It was only towards the first quarter of the 19th century, *i.e.*, from 1823 to 1837 that official attempts were made to organise the educational activities in Bengal, Bombay and Madras. In a resolution dated 17 July, 1823, the Governor General in Council appointed *The General Committee of Public Instruction for the Bengal Presidency*. A grant of one lakh of rupees provided by the Charter Act of 1813 was also placed at the disposal of the Committee. Similar official efforts for the spread of education and its organisation in the presidency of Bombay and in the presidency of Madras were also made but their efforts were isolated and desultory.

In 1853, British India was divided into five units of administration, *i.e.*, presidencies of Bengal, Bombay, Madras, Punjab and the North Western Province—corresponding to the united provinces of today.

In Bengal the General Committee of Public Instruction was replaced by Council of Education. By 1854 the Council of Education is said to have conducted fifteen educational institutions incurring a total expenditure of Rs.

5,94,428 a year. In Bombay, the Bombay Native Education Society (started in 1822) was doing good work. In 1840, when it was wound up to be replaced by the Board of Education, it conducted four District English Schools and 115 primary schools which were of the secondary school standard of the present day. *Bombay was the first province to introduce systematic administration of education.* The whole of the province was divided into three inspectoral divisions each under the charge of a European inspector and Indian Asstt. Inspectors.

“The history of education in Madras during the period 1823-53 makes a painful reading. Although the sanctioned allotment for education in Madras was only Rs. 50,000 a year, the full amount was never spent and a balance of Rs. 3,00,000 had accumulated by 1853—the operations of the Government of Madras in the education department were confined to the collegiate institution under the designation of a University at Madras.” However, the missionary activities were conducted on a very large scale in Madras and consequently English education was imparted more extensively than even in Bombay where there was an English school in each district of the province.

In the North Western Province, the educational institutions were controlled by the Government of Bengal up to 1843 when they were transferred to the NWP.

The Lt. Governor of the province, Mr. Thomson, prepared a scheme for the improvement and expansion of education through the mother tongue which became very popular and was recommended for the consideration of the Provincial Governments in India.

The important issues of the scheme were:

- (1) Government was to establish one school at each tehsil to serve as a model for the indigenous or private schools.
- (2) School Visitors were to be appointed for assisting, advising and rewarding the school masters.
- (3) Over these visitors was placed a Visitor General to supervise their work.
- (4) The landlords were required to pay one per cent of their land revenue to meet the expenses of these schools and colleges but with the explicit consent of the landowners.

The province of Punjab was constituted in 1854. In that year the Government established a school on modern lines at Amritsar. By 1865 when the Department of Education was created there were thirty two schools maintained out of the contributions from the people. These schools were supported by the Government also.

In the five units of British India mainly three types of institutions were conducted:

- (1) Those entirely supported by the State Government, whose number was very small;
- (2) Those run chiefly on the public contributions and partly aided by the Government;
- (3) Those depending entirely on public enterprise.

Institutions of the last category were much more than those of the first two categories combined. Also there was no common policy to be followed, no common guiding lines or controlling authority.

By 1854, the Britishers, as they believed, had a firm footing in India. The Board of Directors, therefore, accepted the responsibility of educating the people of India and thus came the Education Despatch of the Board of Directors of the East India Company in 1854 popularly known as the Wood's Despatch because it was written probably at the instance of Charles Wood, who was then president of the Board of Control.

The Wood's Despatch serves as a landmark in the history of educational administration in India. With this ended the isolated and desultory efforts of various agencies to spread education. The Government of India became the Director, the policy-making authority or the chief custodian of the entire educational gamut in British India. Consequently the Government of India formulated the policies and regulations to be followed by the whole of India. At the Centre an education board to deal exclusively with educational matters was established in the Home Department of the Government of India.

Departments of Public Instruction were created in 1857 in each of the five provinces, *i.e.*, Bengal, Bombay, Madras, the North Western Province and Punjab. The head of the Department was called the Director of Public Instruction and he was the chief executive. He was to be assisted by an adequate number of inspecting officers and was required to submit an annual report on the progress of education in his province. The Department of Education was to start and maintain its institutions. It had to give liberal grants to other *ad hoc* bodies who could suitably manage their institutions as the agent of the Government of India. All educational schemes, however small, had to have the approval of the Centre. The Provincial Governments could not appoint even a teacher without sanction from the Centre. In financial matters the situation was still worse. Thus the Wood's Despatch gave a form and direction to the educational administration.

The exclusive responsibility of the Central Government for all education in the country changed with the decentralisation policy of the Government in 1870. The provinces were allowed some freedom to formulate their own educational plan within their resources and a fixed grant was allocated from the central revenue. Though some of the educational historians are led to believe that relationship between the Central Government and the Provincial Governments was "minor and occasional" but the control and the guidance of the general educational administration lay with the Centre.

This relaxation in the central authority over the Provincial Government and the liberal encouragement to the Government gave a fillip to the private enterprise in the establishment of secondary schools and colleges. There was no well defined relationship between the university and the colleges affiliated to them. Their only relationship appeared to be of conduct of examinations and award of degrees. The main function of most of the colleges was to prepare the students for the examinations and to provide qualified candidates for the award of degrees. The "minor and occasional" central interest in education during the period 1870-97 was followed by "deep and sustained" interest by the Government of India

when Lord Curzon became the Governor General of India in 1899. In 1901, he summoned a conference of the Directors of Public Instruction of the country to discuss the educational situation, its defects and proposals of reforms. The summum bonum of these discussions, though never published, was that:

- (a) Education should be expanded through private efforts; and
- (b) “Expansion” should be accompanied by control and quality.

Lord Curzon, the Viceroy of India, said at the opening of the century “Education in India has muddled along with no one to look after at the Headquarters (Central Secretariat)... In the praiseworthy desire to escape centralisation at the Headquarters they appear to have setup a number of petty kingdoms.” This resulted in increased involvement of the Central Government in educational matters. To strengthen the machinery for education in the Government of India, a Director General of Education was appointed in 1901—the first nucleus of the present Ministry of Education.

He was chiefly responsible for giving advice to the Government of India in educational matters, and also to superintend, guide and coordinate the administration and academic affairs of the provinces for this purpose. He undertook periodic tours to visit the educational institutions in the various states.

A separate Department of Education was created in the Central Government in 1910. It was now under the control of a new education member of the Executive Council of Governor General with two secretaries and one Assistant Secretary—the post of Director General was abolished at this stage—which was revived in 1915 with a changed designation of Education Commissioner.

Another important feature of the period was the creation of all Indian Education Service (IES) in 1896. All the high posts in the Education Department in the country were the exclusive preserve of this new service which was centrally recruited in England and which consisted purely of Britishers. It was through this service that the Government of India controlled the entire educational programme in the country. It was only in 1924 that the recruitment to this service was stopped and the Indianisation of superior service in education began in India.

The policy of ‘control and quality’ had considerable healthy effect on the universities and the colleges. By making the senates more manageable and meaningful the tone of the university improved. The stricter conditions of affiliation and the arrangements for periodical inspections gave a new slant to the college administration. A new feature of the announcement of grant of five lakh a year for five years which became a permanent grant enabled the universities to undertake teaching functions and to equip libraries and laboratories. Appointments of college teachers began to be made by special Selection Committees to improve the quality of teaching.

1921-37: With the introduction of the Government of India Act 1929, came ‘dyarchy’ the rule of the two. It was under this form of political constitution that Indians first obtained the control of the Education Department. Education, with small exceptions, became a provincial and transferred subject in charge of Indian Ministers. The Indian Ministers incharge of education were unfortunately hand and foot bound’ to use a colloquial term. They were working under great handicaps.

- (a) The first great difficulty with the Provincial Governments was of finances. The Provincial Governments had to make a lot of contributions to the Central Government to adjust their budget, thus leaving very little money for the Provincial Governments. This greatly hit the working of the transferred departments in general and of education in particular.
- (b) The Indian Ministers could exercise very little control over the bureaucratic British IES officers who held the key posts in the education department. There was a regular conflict between the Ministers and the IES officers. Consequently the recruitment to the IES was discontinued in 1924.
- (c) The attention of the public was concentrated more on political matters than on educational problems because of the boycott of the legislative councils and non-cooperation movements.

Spread of College Education

Despite the difficulties there was all round expansion of education due to the genuine sacrifices and enthusiasm of people for the cause of education. Persons like Mahatma Hans Raj and Sir R.P. Paranjpe—a senior wrangler of Cambridge University—were prepared to work on pittance in private institutions and in preference to the ‘delights’ of the government service.

The tendencies that we witness during this period are (i) protest against the intellectual domination of the West, and (ii) the drive to create a new educational system suited to national aspirations.

As a result of this struggle there was all round development and improvement. But we shall mainly confine ourselves to universities and collegiate education.

The establishment of the inter-university board in 1924 brought about coordination in the broad outlines of working and courses of studies in the various universities in the country and secured better standard of education to acquire recognition abroad. This step may be called a landmark in aiming at international standards. Many of the older universities underwent important changes in the matter of administration in general and in providing facilities for higher education and research in particular.

Another important feature of the period is the development of the inter-collegiate sports and competitions. This instilled a healthy spirit and competition amongst the students and the teachers and formed an important aspect of the growing national life of the country.

The period is also remarkable for the great attention paid to the activities of corporate life both for the day scholars and the hostelers. Provisions for physical education and medical inspection were also made through medical inspections in colleges.

1937-47: The Government of India Act (1935) introduced full provincial autonomy in 1937 and this gave greater powers to the Indian Education Ministers than they had under dyarchy. It was for the first time, therefore, that the educational problems began to be studied from the ‘national point of view’. A

lot of exploratory and experimental work was done with regard to the primary education, secondary education, adult education, vocational and physical education and teachers' training, *etc.*, but not much work could be done with regard to higher education.

The transfer of control of education from the Central Government to the Provincial Governments not only deprived them of the Central Government's guidance and help but it isolated them from one another. The transfer of control was very helpful to promote education according to the local needs. But this boosted provincialism. There was now, neither any coordinating agency between the Provinces and the Central Government nor among the Provinces themselves.

Feeling the need of this coordination and general common policy for the development of a national system of education, particularly in the area of higher education, Central Advisory Board of Education was revived in 1935.

The Department of Education which was working as a separate department at the centre was amalgamated with the Department of Health and Agriculture to be called the Department of Education, Health and Agriculture. The department was again trifurcated into three separate departments, *i.e.*, Department of Education, Department of Health, and Department of Agriculture, in 1945. The Butler Act (1944) of England, the National consciousness, and the realisation that the development of the country depended on good education had been responsible for giving great importance to educational schemes.

In 1947, the Department of Education was raised to the status of a full fledged Ministry of Education under the charge of a Cabinet Minister, Maulana Abdul Kalam Azad. The ministry was designated differently at different stages according to the volume of work entrusted to it and now it is called the Ministry of Human Resources Development. Perhaps it may be of interest to a student of Educational Administration to at least know the stages through which it has passed.

ORGANISATION

As explained in the earlier part of the book, organisation is the medium through which goals or the objectives envisaged by the administration are achieved. Administration is the pre-executive stage while the actual execution occurs or should occur at the organisational level. It is the coordinated activities of a group of persons constituting the organisation that lead to the common goal.

Organisations are of two types—formal and informal. The formal organisations are established by the external authority, the positions held by the people in such an organisation are determined by some external authorities. For instance, a college has been established by the state government or by some private enterprise. The positions in the college, that is, of the principal, vice-principal, professors, readers and lecturers or of ministerial staff are determined not by the workers in the college but by the external authorities.

An informal organisation grows out of a formal organisation or otherwise on account of the inter-personal relationships of the group. There is a common

affinity in the members of the informal organisation. Each member of the group is able to interact with every other member of the group. The group is formed voluntarily to achieve certain objectives. The group develops its own structure or technique of working. There is no hierarchical order in the group. They are all more or less equal in all respects excepting for doing their assignments allotted by the group itself.

We shall need organisations for the implementation of various educational plans. They can achieve better results if they are a happy combination of both formal and informal organisations. These organisations, particularly informal, should consist of only such members as have an aptitude for the project or the programme. For instance, the work of the dramatic society should be entrusted to the group of people who are interested in it or have the potential for it. But these societies or clubs should be neither quasi-permanent nor purely temporary. In fact they should become a part and parcel of the college—a formal organisation and should create a sub-culture of the college and setup traditions which would continue irrespective of the fact as to who is presiding over its destinies.

Coordination: We have seen earlier that behind every formal organisation, there are a number of informal organisations for sub-organisations. They are all expected to contribute to the main organisation. This is possible only if there is proper coordination among their activities. Otherwise there will be overlapping and wastage of energy. Even for the simple project of building a house, unless there is a suitable coordination between the mason, carpenter, labourers, architect and the supply of various types of materials, not much head way can be made in raising the building. Coordination needs advance planning to correlate the activities and tasks in various areas and to seek the cooperation of all the personnel involved. A little slackness or lethargy on the part of even an insignificant worker may jeopardise the whole project and the organisation.

In a college there are numerous jobs to be done which may be of academic, para-academic or non-academic nature. The college is expected to show excellent academic performance. For this, the entire faculty is to work in close cooperation and to put in concerted efforts. For instance if the teacher of English does not care to bother about the achievement of a student in other subjects and does his own job with utmost devotion and sincerity the overall performance of the college will not improve beyond mediocrity. Likewise a zealous director of physical education may keep sports and athletic 'fans' too much occupied in these activities at their peril because it is the harmonious development of a person which is the objective of all educational administration. To coordinate the tasks and the activities of the personnel is a tall job.

The Principal should keep in touch with each, without causing an unnecessary interference, know their problems and put them on the track whenever any activity seems to be going astray or off the rails. To get the cooperation of the fellow workers is a ticklish affair. The educational administrator must see that

none should feel that he or she is left in isolation, nor should anybody be unduly pampered. A smile or a word of cheer can go a long way in keeping people on the right side.

Control: When we say that an educational administrator should keep the personnel in good humour to secure cooperation in numerous functions of the college, it does not mean that he should be all soft and allow a *laissez faire* policy. The attitude of 'let sleeping dogs lie' or to allow them to do whatever they like will be a positive obstacle in achieving our goals.

Guiding or directing an activity and also evaluating it is a very important part of the administrative process. Various elements of administration, that is, planning, organisation and coordination need to be checked up whether they are in order and are functioning at their best. Control is required in all spheres of the educational process -setting up the aims and objectives, formulation of procedures and techniques, providing equipments, finances, public relations, *etc.*—to achieve our objectives. The main purpose of exercising control is to bring about improvements both qualitatively and quantitatively and to contribute to the realisation of the goals.

Control is exercised through power technique and evaluation. Legal sanctions and social customs give the authority to control; techniques help us in its exercise and evaluation keeps us alert. The techniques of control are the policies. The budget, auditing, time table, curriculum, personal records, periodical reports, *etc.*, serve as a very good measure to keep all concerned on the right track.

Educational control involves largely the human element. Men and women, by and large, do not cherish the idea that they are being controlled. A good administrator while finding faults does it in a manner that it appears as a suggestion and not a command.

Human control is very intriguing. It could be a feudal control where the domination is of one man. In this the relationship is of dependency. The decision is made at the top and the people at the other levels have only to conform to what the boss requires. Bureaucratical control stresses the importance of rules and, impersonalisation of administration. The different roles in this type of control work in isolation and independent of one another. Managerial control emphasises on getting the maximum of the outputs oblivious of the human element.

For an educational administrator the most satisfying control is the 'institution building' control. It is human every inch. The relationship here, is of collaboration, homogeneity or thinking, individual autonomy, mutuality and of working together and not remaining in isolation. There is no attempt to capture power but to control the situation to enable the people to be creative and productive. The emphasis in this type of control is on evolving new and unconventional ways of resolving difficulties and solutions to problems—thereby to create new models for the future.

3

Models of the Learning Process

Let us now turn our attention to some of the models of learning that educational psychologists and educationalists have developed over the years. We will start by examining the three that have probably proved most influential - Gagné's 1956 hierarchy of learning, Piaget's 1969 model of cognitive development and Kolb's 1984 experiential cycle - before turning to one of the most recent - Race's 1993 'ripples' model of learning.

Gagné's Hierarchy of Learning

In 1956, the American educational psychologist Robert M. Gagné proposed a system of classifying different types of learning in terms of the degree of complexity of the mental processes involved. He identified eight basic types, and arranged these in the hierarchy shown in Figure. According to Gagné, the higher orders of learning in this hierarchy build upon the lower levels, requiring progressively greater amounts of previous learning for their success. The lowest four orders tend to focus on the more behavioural aspects of learning, while the highest four focus on the more cognitive aspects.

Increasing Complexity

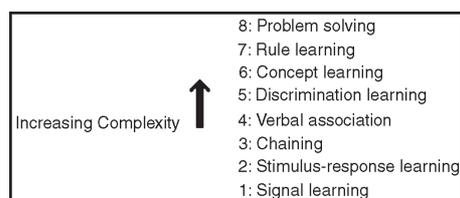


Fig. Gagné's Hierarchy of Learning

Let us now take a closer look at Gagné's eight categories of learning.

Signal Learning

This is the simplest form of learning, and consists essentially of the classical conditioning first described by the behavioural psychologist Pavlov. In this, the subject is 'conditioned' to emit a desired response as a result of a stimulus that would not normally produce that response.

This is done by first exposing the subject to the chosen stimulus (known as the conditioned stimulus) along with another stimulus (known as the unconditioned stimulus) which produces the desired response naturally; after a certain number of repetitions of the double stimulus, it is found that the subject emits the desired response when exposed to the conditioned stimulus on its own. The applications of classical conditioning in facilitating human learning are, however, very limited.

Stimulus-response Learning

This somewhat more sophisticated form of learning, which is also known as operant conditioning, was originally developed by Skinner. It involves developing desired stimulus-response bonds in the subject through a carefully-planned reinforcement schedule based on the use of 'rewards' and 'punishments'. Operant conditioning differs from classical conditioning in that the reinforcing agent (the 'reward' or 'punishment') is presented after the response. It is this type of conditioning that forms the basis of programmed learning in all its various manifestations.

Chaining

This is a more advanced form of learning in which the subject develops the ability to connect two or more previously-learned stimulus-response bonds into a linked sequence. It is the process whereby most complex psychomotor skills (*e.g.*, riding a bicycle or playing the piano) are learned.

Verbal Association

This is a form of chaining in which the links between the items being connected are verbal in nature. Verbal association is one of the key processes in the development of language skills.

Discrimination Learning

This involves developing the ability to make appropriate (different) responses to a series of similar stimuli that differ in a systematic way. The process is made more complex (and hence more difficult) by the phenomenon of interference, whereby one piece of learning inhibits another. Interference is thought to be one of the main causes of forgetting.

Concept Learning

This involves developing the ability to make a consistent response to different stimuli that form a common class or category of some sort. It forms the basis of

the ability to generalise, classify, *etc.* Rule learning. This is a very-high-level cognitive process that involves being able to learn relationships between concepts and apply these relationships in different situations, including situations not previously encountered. It forms the basis of the learning of general rules, procedures, *etc.*

Problem solving. This is the highest level of cognitive process according to Gagné. It involves developing the ability to invent a complex rule, algorithm or procedure for the purpose of solving one particular problem, and then using the method to solve other problems of a similar nature.

Learning and Motivation

Recognition of the meaning of a moment is a perception evolved from one's neurological equipment, past experience shaping the perception, a mixture of hormones in the blood stream, and the extent of knowledge to which one is aware. Most people consider learning as a level playing field that is available to everyone as just something we do.

We are faced with a stimulus, something happens, and behaviour comes out the other side. "Learning" is the process that happens between the stimulus and response. Since the process of learning has been found among humans and most animals, we can assume that it is part of an evolutionary agenda.

Philosophy tends to examine cultural concepts as rational constructs; but, there's something deeper than that. For instance, the theist and the atheist can look at the same thing, as a friend and I were both enjoying a sunny afternoon in the backyard, and both drew support from this same experience for our very different concepts. We were both in awe, but one found no doubt that this glorious experience had to be created, while the other saw no indication of a creator.

When the temporal lobes are excited, as in temporal lobe epilepsy, the result is an intense heightening of the patient's sensory appreciation of the world and intense empathy for all beings to the extent of seeing no barriers between himself and the cosmos. This might be a clue as to the neurological basis of religious and mystical experiences: a neurological effect not experienced by the atheist. Einstein said "the most beautiful and most profound experience is the sensation of the mystical.

It is the source of all true science. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead. To know that what is impenetrable to us really exists, manifesting itself as the highest wisdom and the most radiant beauty which our dull faculties can comprehend only in their primitive forms - this knowledge, this feeling is at the center of true religiousness."

We can see in this example: it can be the perception, or the experience, that is causal to the concept. Due to the philosophical tendency to categorise, and deliberate concepts through reason, we can ignore, or do not understand, the role of perceptual variations. Understanding the variation of perceptual processing is necessary for understanding how and what we learn.

Ethology

Ethology is the study of “fixed action patterns” of behaviour among animals in their natural setting. Ethology introduced the concept of inherent perceptual equipment. Examples include: suckling by infant mammals, the dance of honey bees returning to their nest to communicating the location of nectar, and the imprinting of ducklings on the first moving object that might be a mother duck among many other examples. The Ethologists carefully observed animals to describe what these fixed action patterns of behaviour were; their adaptive value to the species; the trigger or “releasing stimuli” that precedes the behaviour; the embodied physiological mechanisms that produce that behaviour; and what supportive learning is necessary to shape the behaviour. The Ethologists found there is virtually always some amount of experience and resulting reinforcement to shape the fixed action pattern beyond the initial inclination.

The importance of Ethology is that neurological “hard wiring” is an additional consideration to the Behaviourist’s various strategies of reinforcement in the development of behaviour. This study of the capabilities of numerous species and their species specific behaviour underscores the importance of having the necessary equipment for certain behaviours: flying requires an aerodynamic physique and an appropriate nervous system to use it; just as literacy (a human capability) requires the ability for symbolic perception and the appropriate nervous system to interpret, and use it. This means that each species, even each individual, including mankind, is limited in capabilities by their nature.

Conditioning

Pavlov’s Experiments

Ivan Petrovich Pavlov (1849-1936) in 1927 performed an experiment that demonstrated the conditioned reflex. In this experiment a dog was prepared with a cannula in a saliva gland. The dogs were not fed and were hungry. In the first part of the experiment a light was lit just before a drawer of food was opened in front of the dog. Naturally, the saliva gland reacted to the sight of food. At the same time the dog associated the light with the appearance of the food. After a short training period the dog would salivate at the sight of the light without the appearance of the food. The lessons to be learned are:

1. Glandular secretion can be due to stimulation through association in the cortex. An associated stimulus can lead to the secretion of glands, including those associated with emotions. Later understanding has led us to believe that this is the case with virtually every stimulus. Even our thinking can produce a variation in hormonal levels in the blood. The hormones in our blood are one method our internal cells communicate what we think is happening in our environment. There are hormonal combinations for stress, freight, sex, success, and failure.
2. The dog’s responses were inappropriate to the associated signal (the light). The dogs responded to the signal (light) with ptyalin in the saliva, pepsin in the stomach, and trypsin in the pancreas. This association, or sequential

memory, is a very primitive capability. In this case, the dog was shown to have sequential memory in that it quickly learned that the appearance of a light was followed by food. Even a flat worm can learn some significant sequences. An electric shock preceded by the appearance of a light will eventually cause the animal to curl up at the appearance of the light without the electric shock. The flat worm is avoiding the shock.

3. The dog has specialised cells that detect the need for food and signal that message to the dog's mind. Since the time it was a puppy, the dog has learned from an inclination (fixed action pattern) to identify food with his nose, eyes, and motor skills. Pavlov's dogs had their food appreciation shaped to value the Russian dog food and started preparing for eating by exciting their digestive glands and attempting movement against the harness towards the food tray. The dog's cortex associated the light with the food as sequential events, and eventually prepared for the food with the appearance of the light.

Pavlov demonstrated this in several digestive glands. In other situations, danger causes the secretion of epinephrine, the hormone of fear. A threatening situation causes the secretion of norepinephrine, the hormone of aggression and anger. An attractive potential mate causes the secretion of ethylphenylamine from the hypothalamus and causes feelings of love. It should be noted that hormones both affect behaviour and are produced by behaviour. For instance, exercise increases testosterone in females as well as males. Then the testosterone sensitises aggressive parts of the brain and builds muscle tissue. Of course, these were not the conclusions that Pavlov drew. But there is no reason that in the light of subsequent findings regarding hormones and learning that we should not apply more sophisticated interpretations than he possibly could.

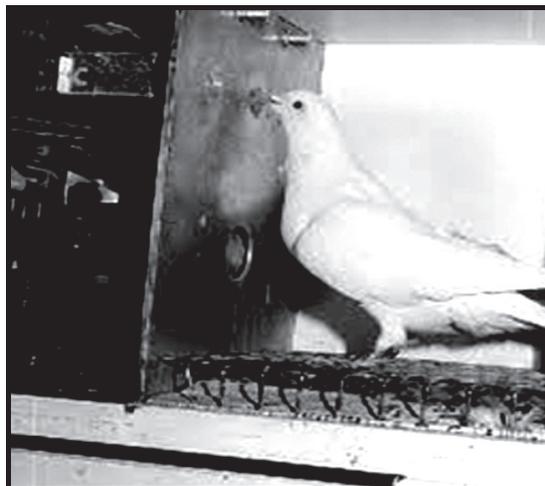
Individual Learning Variation

Every individual human falls within a variety of capabilities that makeup their learning performance characteristics. The secret to a good education is to expose that individual to as many subjects as possible so they might discover where their talents lie. A great education allows a person to reach their ultimate potential capabilities. Some of these capabilities, such as the acquisition of language, or the establishment of attachments and bonding, emerge during a window of time during the maturational development of the individual while others are able to be developed at anytime during the life of the individual. Even though there have been many misdirected biases and prejudices established over time, such as the idea that males are better at math than females, each of us, even the most gifted, have limitations. We are limited by our established collection of knowledge, by what we are inherently able to comprehend, by what we believe is our ability to comprehend, and by our fears.

When I was in graduate school, and behaviourism was the answer, I was required to virtually memorise a book of hundreds of animal experiments trying to decipher what learning was all about. One experiment jumped off the page, even though I have not seen it since. This seemingly insignificant experiment explained the difference between positive (reward) and negative (fear based)

reinforcement. It is a simple experiment with two white rats in two shoe box sized containers. The idea was to train them to jump through a sliding door from one side of the box to the other. In both cases there was a light turned on just prior to the delivery of the reinforcement. The only difference was the motivation for learning this trick. For rat “A” they placed food on the other side of the door. This encouraged him to make the jump. For rat “B” they electrified a grid under his feet. He jumped around till he realised that he could escape the shock by jumping to the other side. This encouraged him to make the jump. It took both rats about the same number of trials to learn the trick. The rat that learned to jump for the food was experiencing “positive reinforcement” while the rat that jumped to avoid the shock was experiencing “negative reinforcement”. The important lesson in this experiment was shown during what they call the “extinction trials”. Why they chose that name, I do not know. During the extinction trials, the light was turned on, but no food or shock was delivered. Soon the rat jumping for food no longer associated food with the light and began sniffing around for another solution. However, the rat jumping to avoid the shock continued to jump and jump for many trials after the shock was turned off. The animal’s behaviour was rigid and did not change even though the shock was no longer present. The rat which learned with positive reinforcement was adaptive and flexible while the rat which learned with negative reinforcement became rigid and fixed. Similarly to Pavlov’s dogs, there is an inappropriate response to an associated signal (the bell or light) when the original stimulus is gone. One of the characteristics of neurotic behaviour is that it takes place inappropriately. Neurotic behaviour and neurotic emotional reactions can often be traced back to a negatively reinforced experience.

Another important aspect of learning was introduced by B. F. Skinner who illustrated general learning principles with pigeons. Skinner probably was too enthusiastic about the application of his concepts. The Behaviourist movement overlooked the fixed action patterns of behaviour and attributed everything to reinforcement. As you are introduced to these few experiments of the many he produced, you will easily be able to identify with the experience of the pigeon.



In all his experiments Skinner deprived the pigeons of food for twenty-four hours to insure the need for food would be a good motivation. The animal was then placed in a cage with a small target disc attached to a lever in such a way that when the pigeon pecks at the disc, a pellet will drop into a nearby tray. The number of pecks on the disc per minute is recorded. As would be expected, the hungry pigeon discovers the disc pecking behaviour, and the number of pecks per minute increases over time to create an upward inclined graph. This is called the “learning curve”.

There are three factors that he found to affect the learning curve.

1. *One to one reinforcement*: In this experiment the pigeon received one pellet per peck. The learning curve was fast, but the animal was soon satiated and the curve crashed.
2. *Fixed interval reinforcement*: In this experiment the pellets were released at regular intervals, such as one every fourth peck. The learning curve is not as steep, but the pigeon had to peck more times before it was satiated. The animal hurried the process along by pecking faster. Do you want faster work? Pay people by commission.
3. *Random-interval reinforcement*: The intervals were selected from a list of random numbers; so, there was no way to predict how many pecks will be necessary to get the next pellet. In this study the learning curve was the least rapid, but the pecking behaviour is eventually the most vigorous by far. This is the principle of the addiction to the unpredictable fruits of gambling. There are other factors involved, of course, but this is one.

All these aspects of learning are motivated by the fulfilment of needs. Each need is initially detected by some neuro-sensitivity that triggers a fixed action pattern. In time, this pattern is shaped by neurologically successful need satisfaction and the resulting repetition. This process can often be a long, subtle evolution of development, beginning in maturation and continuing over a lifetime.

Neurobiology tells us that the continued use of a neural pathway strengthens that pathway with each use. This is why we learn and remember things in school: repetition. Meeting needs on a continual basis is the evolution of establishing pathways. Sometimes need fulfilment is not so immediate. Such as in school. Our frontal cortex has something to do with our ability to keep our eye on a distant goal.

The Role of Needs

The fulfilment of needs is our motivation for learning. The struggle to fulfil our needs is the driving force of our life as we have evolved. The fulfilment of these needs holds the fabric of human society together by motivating human communication and community work.

Needs are the essence of what we pursue, what we strive for, what reinforces our efforts. It stands to reason, in a fruitful society, that each one of us should feel the desire and the possibility of successfully fulfilling our needs. Karl

Marx postulated that it is the frustration of need fulfilment that leads to aggression and revolt. The association of stress and aggression has been biologically linked. Some examples of our needs are: food, shelter, waste removal, activity, sex, safety, belongingness, power, achievement, knowledge, encouragement, beauty, and creativity. The order is not important. Everyone has these needs, but to different degrees depending on environment, culture, and individual variation.

All these roads to need fulfilment are shaped from some original fixed action pattern or heritable inclination that emerges during the maturational development of the individual. The achievement of need fulfilment is the reinforcement necessary for learning.

The Effect of Generalisation

Generalisation is a vague concept describing a combination of neurological events. We are generalising when we see an object in different positions and we can recognise it as the same object. This is known as “gestalt”. We generalise when we have an emotional response to a specific subject through experience and then ascribe that emotion to all other similar subjects. As we have shown, this would be more lasting with a negatively reinforced experience than with a positively reinforced experience.

An example of generalisation is people who say, “all women are the same!” as a person ascribes a characteristic to every member of a class. On the other hand, generalisation could be the prejudicial application of a characteristic of a class to a specific member.

Here we have examples of two natural neurological events, both propensities are evolved through time by nature because they are beneficial to survival. Once again we see problems of rigidity when negative reinforcement is involved. This generalisation characteristic is the basis for racism and prejudice. It has been a primary ingredient in the dehumanisation of a class of people as a preliminary preparation for their eradication in warfare. On the other hand it is the basic requirement of a positive philosophy, or religion, that includes all people.

Reading and Writing

This is an interesting subject because of its correlation with general intelligence and education. I say “correlation” because the two do not always go hand in hand. For instance Charlemagne, an important leader in the eighth century Europe, was credited with many letters but was noted by his biographer as not being able to write his name. On the other hand, I have known a few families with children who learned to read, with little encouragement, a couple of years before they entered school.

Reading and writing are, without a doubt, tied to the maturational development of specific parts of the brain. This is part of the post birth recapitulation of humanity’s evolutionary development through the threshold of literacy. Most children begin to learn to read, with instruction, by age six. About five percent of

the children learn to read on their own by age four. Twenty-five percent will not learn to read till age ten; but, will have caught up to the others by age twelve. A small percentage of children will never learn to read. The lack of acceptance of this simple principle of the maturing brain has cost untold thousands of academically shattered lives.

Since the pressure has been on the schools to show results by second grade, teachers have been trying every method they can think of to cram reading down the throats of students who are slow to mature. As a result, when they finally do mature, they don't want anything to do with reading.

Reading readiness tests are very accurate and well developed. Children who are determined to be unready to read should be deferred from reading instruction. By fourth grade virtually all children are ready for reading instruction and by sixth grade those children are performing as well as the other students. Recognising this phenomenon, a talented teacher, who introduced me to these realisations, started a private learning facility specialising in reading instruction to only fourth, fifth and sixth graders.

He was careful to use teaching methods that were different from their previous schools. The teaching methods were actually no more effective, but were able to introduce the student to reading in a way that the student had not been previously negatively conditioned.

With people who cannot draw, cannot spell, cannot sing, cannot learn foreign languages, it is amazing to me that it is difficult for some people to understand there are people who cannot read, or are poor readers. Low reading ability is a perfectly natural and normal occurrence for a percentage of the population just as is advanced reading ability.

For the poor readers, the written word makes as much sense as a blackboard full of advanced calculus does to most of us. The percentage of non-readers and poor readers is growing; but, it is not the fault of the schools or the parents. Reading is not a heritably guaranteed ability. There are powerful political forces which are unfairly punishing teachers and schools who happen to be populated by children of low reading ability.

Some would like to think that anyone can be anything they want to be; that every human is capable of becoming a college graduate, a physician, a classical musician, a fighter pilot, or an author. Unfortunately, this quixotic idea comes under the heading of "unrealistic idealism" for it is opposed to all evidence. Every attempt to measure the performance of any human behaviour (when displaying performance measure against numbers of people) always produces some sort of Gaussian curve (a bell shaped curve) as would be predicted by the requirement of variation in biological evolution. The majority of the performers fall in a range around the average while the high and low performers fall off in number.

Transfer of Learning

Transfer of learning is the study of the dependency of human conduct, learning, or performance on prior experience. The notion was originally introduced as

transfer of practice by Edward Thorndike and Robert S. Woodworth. They explored how individuals would transfer learning in one context to another context that shared similar characteristics – or more formally how “improvement in one mental function” could influence another related one.

Their theory implied that transfer of learning depends on the proportion to which the learning task and the transfer task are similar, or where “identical elements are concerned in the influencing and influenced function”, now known as *identical element theory*. Transfer research has since attracted much attention in numerous domains, producing a wealth of empirical findings and theoretical interpretations. However, there remains considerable controversy about how transfer of learning should be conceptualised and explained, what its probability occurrence is, what its relation is to learning in general, or whether it may be said to exist at all.

Most discussions of transfer to date can be developed from a common operational definition, describing it as the process and the effective extent to which past experiences (also referred to as the transfer source) affect learning and performance in a current novel situation (the transfer target) (Ellis, 1965; Woodworth, 1938). This, however, is usually where the general consensus between various research approaches ends.

There are a wide variety of viewpoints and theoretical frameworks apparent in the literature. For review purposes, these are categorised as follows:

- A taxonomical approach to transfer research that usually intends to categorise transfer into different types;
- An application domain-driven approach by focusing on developments and contributions of different disciplines that have traditionally been interested in transfer;
- The examination of the psychological scope of transfer models with respect to the psychological functions or faculties that are being regarded; and
- A concept-driven evaluation, which reveals underlying relationships and differences between theoretical and empirical traditions.

Transfer Taxonomies

Of the various attempts to delineate transfer, typological and taxonomic approaches belong to the more common ones. Taxonomies are concerned with distinguishing different types of transfer, and therefore less involved with labelling the actual vehicle of transfer, *i.e.*, what is the explanatory mental unit of transfer that is carried over.

Hence, a key problem with many transfer taxonomies is that they offer an excessive number of labels for different types of transfer without engaging in a discussion of the underlying concepts that would justify their distinction; *i.e.*, similarity and the nature of transferred information.

This makes it very difficult to appreciate the internal validity of the models. The following table presents different types of transfer, as adapted from Schunk (2004, p. 220).

| Type | Characteristics |
|------------------------------------|---|
| Near | Overlap between situations, original and transfer contexts are similar. |
| Far | Little overlap between situations, original and transfer settings are dissimilar. |
| Positive | What is learned in one context enhances learning in a different setting. |
| Negative | What is learned in one context hinders or delays learning in a different setting. |
| Vertical | Knowledge of a previous topic is essential to acquire new knowledge. |
| Horizontal | Knowledge of a previous topic is not essential but helpful to learn a new topic. |
| Literal | Intact knowledge transfers to new task. |
| Figural | Use some aspect of general knowledge to think or learn about a problem. |
| Low Road | Transfer of well-established skills in almost automatic fashion. |
| High Road | Transfer involves abstraction so conscious formulations of connections between contexts. |
| High Road/ Forward Reaching | Abstracting situations from a learning context to a potential transfer context. |
| High Road/ Backward Reaching | Abstracting in the transfer context features of a previous situation where new skills and knowledge were learned. |

Apart from the effect-based distinction between negative and positive transfer, taxonomies have largely been constructed along two, mostly tacit, dimensions. One concerns the predicted relationship between the primary and secondary learning situation in terms of the categorical overlap of features and knowledge specificity constraints. The other concerns general assumptions about how transfer relationships are established, in terms of mental effort and cognitive process.

The Effect-perspective: Positive vs Negative Transfer

Starting by looking at the effect side of transfer – in terms of the common performance criteria, speed and accuracy – transfer theories distinguish between two broad classes that underlie all other classifications: *negative* and *positive* transfer.

Negative transfer refers to the impairment of current learning and performance due to the application of non-adaptive or inappropriate information or behaviour. Therefore, negative transfer is a type of interference effect of prior experience causing a slow-down in learning, completion or solving of a new task when compared to the performance of a hypothetical control group with no respective prior experience. Positive transfer, in contrast, emphasizes the beneficial effects of prior experience on current thinking and action. It is important to understand that the positive and negative effects of transfer are not mutually exclusive, and therefore real-life transfer effects are probably mostly a mixture of both. Positive

transfer: transfer of learning or training is said to be positive when the learning or training carried out in one situation proves helpful to learning in another situation. Examples of such transfer are:

- The knowledge and skills related to school mathematics help in the learning of statistical computation;
- The knowledge and skills acquired in terms of addition and subtraction in mathematics in school may help a child in the acquisition of knowledge and skills regarding multiplication and division;
- Learning to play badminton may help an individual to play ping pong (table tennis) and lawn tennis.

The Situation Perspective: Specific vs General, Near vs Far Transfer

The situation-driven perspective on transfer taxonomies is concerned with describing the relation between transfer source (*i.e.*, the prior experience) and transfer target (*i.e.*, the novel situation). In other words, the notion of novelty of the target situation *per se* is worthless without specifying the degree of novelty in relation to something that existed before. Butterfield and Nelson (1991), for example, distinguish between *within-task*, *across-task*, and *inventive* transfer. A similar classification approach reappears in many situation-driven transfer taxonomies (*e.g.*, *similar* vs. *different* situations, *example-to-principle* and vice versa, *simple-to-complex* and vice versa) and can be noted as distinctions made along the *specific* vs. *general* dimension. Mayer and Wittrock (1996, pp. 49ff.) discuss transfer under the labels of general “transfer of general skill” (*e.g.*, “Formal Discipline”, Binet, 1899), “specific transfer of specific skill” (*e.g.*, Thorndike’s, 1924a, b, “identical elements” theory), “specific transfer of general skill”, and “meta-cognitive control of general and specific skills” as a sort of combination of the previous three views.

Haskell’s (2001) taxonomy proposes a more gradual scheme of similarity between tasks and situations. It distinguishes between non-specific transfer (*i.e.*, the constructivist idea that all learning builds on present knowledge), application transfer (*i.e.*, the retrieval and use of knowledge on a previously learned task), context transfer (actually meaning context-free transfer between similar tasks), near vs. far transfer, and finally displacement or creative transfer (*i.e.*, an inventive or analytic type of transfer that refers to the creation of a new solution during problem solving as a result of a synthesis of past and current learning experiences). Both near and far transfer are widely used terms in the literature. The former refers to transfer of learning when task and/or context change slightly but remain largely similar, the latter to the application of learning experiences to related but largely dissimilar problems.

The Process Perspective

The *specific* vs. *general* dimension applies not just to the focus on the relation between source and target, *i.e.*, from where to where is transferred, but also to the question about the transfer process itself, *i.e.*, what is transferred and how. *Reproductive* vs. *productive* transfer are good examples of this type of distinction,

whereas reproductive transfer refers to the simple application of knowledge to a novel task, productive transfer implies adaptation; *i.e.*, mutation and enhancement of retained information.

A similar dichotomous distinction is the one between *knowledge* transfer and *problem-solving* transfer (Mayer and Wittrock, 1996). Knowledge transfer takes place when knowing something after learning task *A* facilitates or interferes with the learning process or performance in task *B*. Knowledge used is referred to by many different terms, such as declarative or procedural types (Anderson, 1976), but it means that there are representational elements that suit *A* and *B*. Problem solving transfer, on the other hand, is described as somewhat more “fluid knowledge” transfer, so that experience in solving a problem *A* helps finding a solution to problem *B*. This can mean that the two problems share little in terms of specific declarative knowledge entities or procedures, but call for a similar approach, or solution search strategies (*e.g.*, heuristics and problem solving methods).

The issues discussed in problem-solving transfer literature are also closely related to the concepts of *strategic* and *theoretic* transfer (Haskell, 2001, p. 31), and cognitive research on analogical reasoning, rule-based thinking and meta-cognition. Indeed, far transfer can be considered as the prototypical type of transfer, and it is closely related to the study of analogical reasoning. Within the problem-solving literature the distinction between specific and general methods is made mostly with reference to Newell and Simon’s (1972) strong vs. weak problem solving methods.

Another concern that is frequently addressed in transfer taxonomies is the question of conscious effort. *High-road* vs. *low-road* transfer (Mayer and Wittrock, 1996; Salomon and Perkins, 1989) expresses a distinction between such instances of transfer where active retrieval, mapping, and inference processes take place, as opposed to those instances that occur rather spontaneously or automatically. Hence, low-road transfer concerns frequently employed mental representations and automated, proceduralised knowledge, and occurs preferably in near transfer settings. In contrast, high-road transfer is more conception-driven, and requires cognitive and meta-cognitive effort.

Traditional Fields of Transfer Research

There are a nearly unlimited number of research fields that share some applied interest into the study of transfer, as it pertains to learning in general. Three fields that contributed in most substantial ways to the progress of transfer research, both from a conception and empirical point of view, are the fields of education science, linguistics, and human-computer interaction (HCI). In fact, most transfer research has been conducted in reference to one of these applied settings, rather than in basic cognitive psychological laboratory conditions.

Education Science: Teaching for Transfer

Due to their core concern with learning, educational science and practice are the classic fields of interest regarding transfer research, and probably the

prime target for the application of theories. Transfer of learning represents much of the very basis of the educational purpose itself. What is learned inside one classroom about a certain subject should aid in the attainment of related goals in other classroom settings, and beyond that it should be applicable to the student's developmental tasks outside the school; the need for transfer becomes more accentuated. This is because the world educators teach in today is different from the world they themselves experienced as students, and differs equally from the one their students will have to cope with in the future. This is why the promotion of instruction designed to educate students on the process of enquiry so that they can apply it readily for themselves is recommended.

By nature of their applied interest, educationalists' main concern has been less with the question of how transfer takes place, and much more with under what conditions, or, that it happens at all. The basic conviction that student's learning and achievement levels depend primarily on learning and achievement prerequisites, has constituted a central part in educational learning theories for quite some time. The major focus in educational transfer studies has, therefore, been on what kind of initial learning enables subsequent transfer: *teaching for transfer*. Research on learning and transfer has identified key characteristics with implications for educational practice.

Implications for School Psychology Practice

It is important for teachers to facilitate the transfer of learning to their students and not merely regurgitate the things they learned during their university experience. However, many instructors have been out of the classroom for a decade or more and the study of transfer was not a part of their curriculum. Therefore, it is important that these instructors understand the process of transfer so that they can design their lesson plans with it as a goal. School psychologists have a general understanding of how pedagogical applications of psychology in the classroom affect learning. Therefore, it is important when considering systems of support using the Response to Intervention (RTI) model that school psychologists first assess through observation if a teacher's current pedagogical practices promote transfer. If current practices do not, this could prevent the transfer of classroom knowledge which can affect a child's behaviour and their perceived intellectual ability.

From Formal Discipline to Meta-cognition

Educational transfer paradigms have been changing quite radically over the last one hundred years. According to the doctrinaire beliefs of the Formal Discipline (Binet, 1899) transfer was initially viewed as a kind of global spread of capabilities accomplished by training basic mental faculties (*e.g.*, logic, attention, memory) in the exercise of suitable subjects, such as Latin or geometry. With the turn of the 20th century, learning, and therefore transfer of learning, was increasingly captured in behavioural and empiricist terms, as in the Connectionist and Associationist theories of Thorndike (*e.g.*, 1932), Guthrie (*e.g.*, 1935), Hull (*e.g.*, 1943), and Skinner (*e.g.*, 1938). Thorndike (1923, 1924a

and b) attacked the Formal Discipline empirically and theoretically and introduced the theory of “identical elements”, which is probably still today the most influential conception about transfer (Thorndike, 1906; Thorndike and Woodworth, 1901a, b and c). Thorndike’s belief that transfer of learning occurs when learning source and learning target share common stimulus-response elements prompted calls for a hierarchical curricular structure in education. “Lower” and specific skills should be learned before more complex skills, which were presumed to consist largely of configuration of basic skills. This small-to-large learning, also referred to as part-to-whole or vertical transfer, has been popular with theories of learning hierarchies (Gagné, 1968).

It has later been challenged from conceptualistic point of views, which argue that learning is not just an accumulation of pieces of knowledge (*i.e.*, rote memorisation), but rather a process and product of active construction of cognitive knowledge structures. Knowledge, from a constructivist perspective, was no more believed to be a simple transfer by generalisation to all kinds of situations and tasks that contain similar components.

The critical issue was the identification of similarities in general principles and concepts behind the facades of two dissimilar problems; *i.e.*, transfer by insight. This idea became popular in the Gestaltists’ view on transfer (*e.g.*, Katona, 1940), and, in combination with growing interest in learners as self activated problem-solvers (Bruner, 1986), encouraged the search for abstract problem-solving methods and mental schemata, which serve as analogy-enhancing transfer-bridges between different task situations.

Emerging from these developments, a new theme started to dominate educationalists’ research in transfer: meta-cognition (Brown, 1978; Brown and Campione, 1981; Campione and Brown, 1987; Flavell, 1976). In contrast to classical knowledge forms like declarative and procedural knowledge, different types of meta-knowledge and meta-cognitive skills such as strategic knowledge, heuristics, self-monitoring skills, and self-regulation quickly became the road to learning and transfer. Characterised as self-conscious management and organisation of acquired knowledge (Brown, 1987) it is evident that meta-cognitive awareness of task features, problem structures, and solution methods makes relations between different situations cognitively salient: only an individual who learns from learning, learns for future learning. Soini (1999) developed on the same core ideas an examination of the preconditions for active transfer. Her emphasis is on the active and self-reflected management of knowledge to increase its accessibility. To some researchers, meta-cognition and transfer have become so entangled that the argument was generated that only the measurement of positive transfer effects truly supports inferences that meta-cognitive learning has taken place.

The Generality Predicament: Return to the Specificity View

Ever since the introduction of the meta-knowledge theme in education science, transfer discussions have been oscillating between the position taken by those representing the meta-cognitive view and those who stress that generic

knowledge forms alone do not allow an effective transfer of learning. When knowledge stays “on the tip of the tongue”, just knowing that one knows a solution to a problem, without being able to transfer specific declarative knowledge (*i.e.*, know-what) or automated procedural knowledge (*i.e.*, know-how), does not suffice. Specific teaching of the cognitive and behavioural requisites for transfer marked in principle a return to the identical element view, and can be summarised with Dettermann’s (1993) conclusion that transfer does not substantially go beyond the restricted boundaries of what has been specifically taught and learned. The basic transfer paradigms in educational psychology keep replicating themselves, and fundamental promotion of transfer itself is seen to be achievable through sensibilisation of students by creating a general culture and “a spirit of transfer” inside the classroom on the one hand, and by allowing concrete learning from transfer models on the other (Haskell, 2001).

Learning and Transfer: Implications for Educational Practice

A modern view of transfer in the context of educational practice shows little need to distinguish between the general and specific paradigms, recognising the role of both identical elements and metacognition. In this view, the work of Bransford, Brown and Cocking (1999) identified four key characteristics of learning as applied to transfer. They are:

1. The necessity of initial learning;
2. The importance of abstract and contextual knowledge;
3. The conception of learning as an active and dynamic process; and
4. The notion that all learning is transfer.

First, the necessity of initial learning for transfer specifies that mere exposure or memorisation is not learning; there must be understanding. Learning as understanding takes time, such that expertise with deep, organised knowledge improves transfer. Teaching that emphasizes how to use knowledge or that improves motivation should enhance transfer.

Second, while knowledge anchored in context is important for initial learning, it is also inflexible without some level of abstraction that goes beyond the context. Practices to improve transfer include having students specify connections across multiple contexts or having them develop general solutions and strategies that would apply beyond a single-context case.

Third, learning should be considered an active and dynamic process, not a static product. Instead of one-shot tests that follow learning tasks, students can improve transfer by engaging in assessments that extend beyond current abilities. Improving transfer in this way requires instructor prompts to assist students – such as dynamic assessments – or student development of metacognitive skills without prompting.

Finally, the fourth characteristic defines all learning as transfer. New learning builds on previous learning, which implies that teachers can facilitate transfer by activating what students know and by making their thinking visible. This includes addressing student misconceptions and recognising cultural behaviours that students bring to learning situations.

A student-learning centred view of transfer embodies these four characteristics. With this conception, teachers can help students transfer learning not just between contexts in academics, but also to common home, work, or community environments.

Inter-language Transfer

Another traditional field of applied research is inter-language transfer. Here, the central questions were: how does learning one language (L1) facilitate or interfere (Weinreich, 1953) with the acquisition of and proficiency in a second language (L2), and how does the training and use of L2, in turn, affect L1? Several variations of this conception of inter-language transfer can be found in the literature, also referred to as mother tongue influence or cross language interference. What makes inter-language transfer a complex and valuable research matter is the fact that language knowledge skills continuously develop. This is so for L1, as well as for L2, when only bilingualism is considered, while alternately at least one of them is continuously in use. This has led to the development of very different models of how languages are mentally represented and managed, with L1 and L2 seen as two independent or autonomous mental systems, as being represented in a single unified system, and as rooting in a common underlying, multi-lingual conceptual base.

Human-Computer Interaction: Designing for Transfer with Technology

A third research area that has produced a variety of transfer models and empirical results can be located within the field of Human-Computer Interaction (HCI). With the start of the user age in the 1980s, HCI as well as other kinds of technology have become psychological micro-worlds for cognitive research. Favourable cognitive approaches to transfer research were accelerated by rapid changes in modern lifestyles, resulting in a virtual upsurge of cognitive demands in interaction with technology. Domain-focused cognitive models were used to study the way users learn and perform when interacting with information technological systems as a result.

Technology has been successfully used to increase the degree with which learners effectively utilise skills and knowledge gained through class in the real world. This interaction of learners with computers and other technology has altered the landscape of education by reducing the need for paper based educational artifacts, altering curriculum, and introducing a plethora of innovations that allow for key simulations and virtual experiences in the learning environment. Examples of curriculum shifts related to HCI include the change from penmanship towards word processing and computer languages being allowed to be substituted as foreign language requirements. Instructors that properly implement HCI simulations and animation in the learning environment create a learning state that reflects actual situations in which the knowledge or skill will likely be used in. This transfer using HCI techniques has been shown to effectively increase transmission for both scientific and technology knowledge. HCI also allows for group based learning as opposed to teacher based learning

through interactive and individualised technologies including: blogs, wikis, social networks, video casts, and virtual worlds such as Second Life. These various aspects of HCI allow for unique learning experiences to be undertaken that highlight different learning styles and cultural perspectives helping to increase transfer.

Transfer is increased when learners see the potential transfer implications of what they are learning. Properly designed HCI interfaces promote visual thinking that leads to more successful transfer as well. The field of Instructional Design will be an area primarily focused on design principles and the implications on successful blending of HCI to optimise transfer. The learner base that benefits the most from transfer enhanced HCI implementations consists of digital natives to these concepts and expertise. The instructors however are often first generation computer users with limited prior knowledge. Often this makes it difficult to incorporate HCI into improved conditions for transfer within the new world learning environments. While these “digital immigrants” struggle to successfully incorporate technology into areas such as transfer, it is possible to overcome with proper goal setting, assessments, peer support, and instructor support.

Transfer Based on the User Complexity Theory

Thorough investigations of cognitive skills involved in HCI tasks have their origins with the research on text editing. The offspring of this type of research were computational cognitive models and architectures of various degrees of sophistication, suitable for all kinds of man-machine interaction studies, as well as studies outside of the HCI domain. The original examples for these have become Kieras and Polson’s (1985) user complexity theory (later rephrased as cognitive complexity theory) and the GOMS family (*i.e.*, Goals, Operators, Methods, Selection) rules based on the Model Human Processor framework. All of these models have their roots in the basic principles of production systems and can be comprehended with the help of ends-means-selections and If-Then-rules, combined with the necessary declarative and procedural knowledge.

The crucial perspective for transfer became that of technology design. By applying cognitive models, scientists and practitioners aimed at minimizing the amount and complexity of new knowledge necessary to understand and perform tasks on a device, without trading off too much utility value. A key responsibility was given to skill and knowledge transfer. Due to the fact that the cognitive complexity theory is a psychological theory of transfer applied to HCI, the central question was how these models, united under the GOMS umbrella, can be used to explain and predict transfer of learning.

The basic transfer-relevant assumptions of the emerging models were that production rules are cognitive units, they are all equally difficult to learn, and that learned rules can be transferred to a new task without any cost. Because learning time for any task is seen as a function of the number of new rules that the user must learn, total learning time is directly reduced by inclusion of productions the user is already familiar with. The basic message of the cognitive complexity theory is to conceptualise and induce transfer from one system to another by function of shared production rules, which is a new interpretation of

Thorndike's (1923, 1924a and b) identical element premise and eventually echoed in Singley and Anderson's (1989) theory of transfer. A practical implication of the procedural communality principle has been formulated by Lewis and Rieman (1993), who suggest something like "transfer of design" on the side of the industry: "You should find existing interfaces that work for users and then build ideas from those interfaces into your systems as much as practically and legally possible."

Emergence of Holistic Views of Use

Discouraged by the confined character of the GOMS-related transfer models, many research groups began to import and advance new concepts, such as schemata principles and general methods; a general development encouraged by the emerging cognitive approach to transfer that was also witnessed by other applied fields. Bhavnani and John (2000) analysed different computer applications and strived to identify such user strategies (*i.e.*, general methods to perform a certain task), which generalise across three distinct computer domains (word processor, spreadsheet, and CAD). Their conclusive argument is that "strategy-conducive systems could facilitate the transfer of knowledge" (p. 338). Other research groups' authors that assessed the questions about how people learn in interaction with information systems, evaluated the usefulness of metaphors and how these should be taken into consideration when designing for exploratory environments.

As researchers became increasingly interested in the quality of a user's knowledge representation, mental models and adaptive expertise, as knowledge and skills which generalises across different contexts of complex problem-solving tasks, became of paramount concern. In contrast to the knowledge of strategies (Bhavnani and John, 2000), the accentuation shifted towards strategic knowledge. Gott *et al.* demonstrated that surface similarities between different technical domains alone did not essentially facilitate transfer of learning because they limited the user's flexibility in the adaptation process. In accordance with the ideas of schema-based and meta-cognitive transfer, the authors further formulated that "robust performance is one in which procedural steps are not just naked, rule-based actions, but instead are supported by explanations that perform like theories to enable adaptiveness".

Gott *et al.* (1993) finally noted that mental models might be powerful instruments to analyse similarities between tasks as represented within a formulated cognitive architecture. However, they do not explain what particular similarities and differences are sufficiently salient from the individual's mental point of view to affect transfer of learning, nor can they predict motivational or emotional conditions of transfer that are essential requisites for every learning process.

Psychological Scope of Transfer Research

As transfer pertains to the dependency of an individual's experience and behaviour on prior experience and behaviour, its research must involve all aspects

of psychological functioning, ranging from physical activities, cognitive processes (*e.g.*, thinking), emotion and connotation, to its social and environmental dimensions. Although the cognitive connotation of skill has largely emerged as the dominant conception, it is not truly possible to appreciate the real meaning of skill without linking it to its motor or behavioural origins (Adams, 1987; Pear, 1927, 1948), and without extending its scope to include socio-emotional dimensions.

Cognitive Transfer

The greatest bulk of theoretical and empirical research published in recent decades has been done with reference to transfer of cognitive skills and knowledge; for example with regard to problem-solving and analogical reasoning. The cognitive shift in psychology showed a great impact on the evolution of new and refined concepts, methods, theories, and empirical data in transfer research, and it put the investigation of the phenomenon back on the general research agenda after a clear decline in relevant scientific publications between 1960 and the 1980s.

Cognition-oriented theories reinforced a series of key research frameworks to the study of transfer, including production systems, analogical reasoning, mental models, schema, heuristics, and meta-cognition. Specifically, research on transfer has profited from three main drivers within the study of human cognition: these are analogy, the computational metaphor, and the intensified interests with the nature and quality of mental representations.

Metaphor and Analogy

Metaphor refers to the use of a word or phrase to denote an object or concept not in a literary sense, but rather by suggesting an enhancement or replacement of the understanding and interpretation of the targeted object with the metaphor. The object we are indicating by a metaphor is holistically mapped onto the metaphor – and essentials of the metaphor’s content are therefore transferred to the representation of the denoted object. The term metaphor comes from the Greek word “*metapherein*”, meaning “to transfer”.

In contrast to metaphor, the concepts of similarity and analogy are actually less inherently linked to the mental nature of transfer because they refer only to the circumstance of the relation between two representations. Here, object P is “seen” to be like Q (according to the Latin word “*similis*”, meaning “like”) in certain aspects. By inferring that there might be other similar states between P and Q to be found, P can be used as an analogy for Q. Transfer by analogy is not understood in the holistic way as is the case with metaphorical substitution of meaning, but rather in a channelled fashion due to aspectual (perceived or inferred) resemblance between P and Q.

Nevertheless, research on analogy, in all its nuances, proved to be most influential to the conceptualisation of cognitive transfer. Many cognitive scientists, as well as road leading philosophers, consider analogy to be one if not the core principle of human thinking and thought. According to these views

transfer has to be placed within the framework of analogy, rather than the other way around. Although research into analogy frequently penetrates traditional cognitive boundaries, for instance by involving emotionality and social cognition, it is usually associated with analogical reasoning and problem solving, both of which are closely related to the issue of transfer (Robertson, 2001).

Computational Models

The nearly unifying cognitive metaphor is known as the information-processing approach (Eysenck, 2000; Kuhn, 1970; Lachman, Lachman and Butterfield, 1979), and with the understanding of the learning individual inspired by the General Problem Solver. Cognitive research brought forth a variety of computational models and methods to study and simulate knowledge acquisition, retention, and use. This also provided a new framework for transfer theory development, particularly Singley and Anderson's (1985, 1989) cognitive account of Thorndike's identical element theory. Emphasis is put on the classic knowledge form distinction between declarative and procedural knowledge (Anderson, 1995) as well as between weak problem-solving methods (*i.e.*, generalised, domain-independent knowledge and skills) and strong problem-solving methods.

Anderson (1995) criticized preceding research on analogical transfer for its dominant focus on traits of the source and target in terms of declarative knowledge, instead of performance orientated processing aspects. He points out for skill acquisition that declarative memory plays only initially a significant role and is in the course of practice quickly replaced by procedural memory; encoded and strengthened in the form use specific production rules (also called the effect of *Einstellung*; Luchins, 1942). The performance benefits from already compiled production rules are believed to be automatic, errorless, independent of each other, and largely independent of contextual variations of tasks within the same knowledge domain. The transfer distance between the performances in two tasks, or the solutions to two problems, is assumed to decrease proportionally to the number of share specific procedures. This procedural "proportionality-relationship" (Allport, 1937) is in effect the most straightforward interpretation of the Greek term of analogy, meaning proportion, and has in ideal cases of procedure-to-procedure transfer settings, been shown to make relatively good predictions. Anderson's assessment echoed the fact that research on human learning and problem-solving started to put increasing emphasis on issues like cognitive skills and mental operators, which found implementations in a variety of cognitive architectures such as Soar (*i.e.*, State, Operator, And Result; Laird, Newell and Rosenbloom, 1987; Laird, Rosenbloom and Newell, 1984; Newell, 1990; Rieman *et al.*, 1994), CE+ (Polson, Lewis, Rieman, and Wharton, 1992; Wharton, Rieman, Lewis and Polson, 1994), and the development of several versions of Anderson's ACT theory.

In recent decades, cognitive scientists have developed numerous computational models of analogy such as the Structure Mapping Engine (SME) and the "model of similarity-based retrieval" (MAC/FAC; Forbus, Ferguson,

and Gentner, 1994; Gentner and Forbus, 1991), Analogical Coherence Models (Holyoak and Thagard, 1989, 1995) Learning and Inference with Schemas and Analogies (LISA; Holyoak and Hummel, 2001) to name just a few. Within LISA's cognitive architecture, for instance, analogical mapping and retrieval functions are based on the premise that structural units in long-term memory (*i.e.*, propositions, sub-propositions, objects and predicates) of source and target are represented by a collection of shared activated semantic units (Holyoak and Hummel, 2001; Hummel and Holyoak, 1997).

Motor Transfer

Senso-motor skills are an essential ingredient in learning and performance in most tasks and can be categorised into continuous (*e.g.*, tracking), discrete, or procedural movements. Proceduralised motor skills have recently become the most referred to because they are consistent with the models of cognitive architectures and because they are seen as relevant to nearly all physical interactions with the environment, as is the case in transfer situations.

Open-loop and Closed-loop Processes

Before the birth of the proceduralisation concept, theories of motor learning have been influenced by the open-loop vs. closed loop system distinction. The original formulation of the closed-loop view on motor performance and learning build on the momentum of internal feedback from executed movements, which allow for error detection and adjustment of actions through the process of contrasting perceptual traces against memory representations. Motor learning was accordingly seen as dependent on repetition, accuracy, refinement, and synchronisation of a series of called-up movement units (*i.e.*, open-loop structures) that are regulated by closed-loop structures.

In response to this view, a different open-loop perspective emerged, namely the one of motor programmes (Schmidt, 1975). The learning of motor skills was hereby seen in terms of the build-up, modification, and strengthening of schematic relations among movement parameters and outcomes. This learning results in the construction "generalised motor programmes" (*i.e.*, a sequence or class of automated actions) that are triggered by associative stimuli, habit strengths, and re-enforcers, and can be executed without delay.

Both theories have their origin with Thorndike's "Law of Effect", because the formation of motor behaviour is essentially dependent on knowledge of the outcome of the action taken. This is regardless of whether the essence of motor skills is seen with specific movements or parameters in a schematic motor programme.

Another classic theme that was revived in the literature on transfer of motor skill is the part-to-whole transfer of training. It emerged because it is nearly inconceivable to learn a highly complex motor task as a complete entity. Much like in curriculum research, positive generalisation of skill units into coherent task situations has been very limited. Particularly, it was found that initial whole-task performances after part-task training remains seriously impaired due to

difficulties in the time-sharing of the activities. Whole task training remains generally superior to the part-task-whole-task transfer approach of learning.

Finally, motor research provided some evidence for context- and task-independent savings in learning effort on a new task that seems to be explainable by heightened plasticity and functional reorganisation in the senso-motor neural network system. This is naturally in line with the formal discipline argument.

Socio-emotional Dimensions of Transfer

Motor and cognitive transfer are, in many respects, inseparable from issues of emotion and motivation, just as cognitive research in general must embrace affective dimensions of experience and behaviour. This basic awareness has a long tradition in psychology and in the philosophical works of Aristoteles, Descartes, and Hume, but has to date not been sufficiently regarded in cognitive research.

Naturally, emotions and especially motivation have always been closely linked to learning in educational psychology, but their role was generally conceptualised as more of an assistant or moderating nature, *i.e.*, in facilitating vs. hindering cognition. Approaches that focus on the same kind of relation between affect and transfer belong to the group that study main effects of affective beliefs on cognition in general, and in particular on transfer-relevant moderation and mediation effects of “will” on “skill”.

In a review of research on motivation and transfer, Pugh and Bergin (2006) concluded that motivational factors can influence transfer, although the research is limited and not wholly consistent. They found that mastery goals were more consistently linked to transfer success than were performance goals. They also found that interest was related to transfer success when this interest was associated with the learning content. However, when the interest was related to peripheral things, such as seductive details in text, it inhibited transfer success. In addition, they found evidence that transfer success was positively related to self-efficacy. Finally, the reviewers proposed that the transfer process is affected by the presence of an explicit goal of achieving transfer. Pugh and Bergin (2006) predicted that motivational factors influence transfer in three ways. First, they can influence the quality of initial learning in ways that support transfer. Second, they can influence the initiation of transfer attempts, particularly in situations where individuals have an opportunity to apply learning but are not required to. Third, motivational factors can influence individuals’ persistence when engaged in transfer tasks.

Transfer of Emotions

Emotional transfer must, however, be regarded as a distinct aspect or type of transfer itself, *i.e.*, one where the experiential relation between two situations is of affective nature (*e.g.*, affective connotations and skills). It occurs wherever previously experienced feelings and attitudes towards a situation, object, or task are re-evoked in a current confrontation with related “symbols”. The preferred emotional transfer model to date has been the one of analogical

inference, *e.g.*, if you like product X, and product Y is similar to X, then you will probably like Y. Thagard and Shelley (2001) criticized the simplicity of analogical inference based on mere comparison of objects and properties and proposed a more complex model that accounts for structures of analogies, *e.g.*, by including relations and causality structures. Their emotional coherence theory implemented this idea in the form of the HOTCO model (standing for “hot coherence”) by drawing on assumptions made in preceding models, including explanatory coherence (ECHO), conceptual coherence (IMP), analogical coherence (ACME), and deliberative coherence (DECO).

Conceptual Foundation of Transfer Research

The cognitive shift in psychology encouraged the research of mental forms and processes engaged in learning and transfer rather than the simple modification of overt reproductional behaviour; a change in viewpoint that the early Gestalt psychologists and constructivists such as Köhler, Wertheimer, or Piaget had already propagated for a couple of decades. The investigation of cognitive dimensions in transfer quickly became the major driver of research across applied domains and cognitive transfer emerged in many ways as the quintessential view of transfer in general.

Mental Representations and Transfer: Common Element-based vs Schema-based Approaches

The majority of mental processes studied in research on human cognition have one thing in common: they all pertain in one way or another to the construction of mental representations. This is true, for instance, for perceiving, learning, problem-solving, reasoning and thinking, and recalling, as much as it is true for the phenomenon of transfer.

Although research on mental representation has been utterly manifold, two main traditions can be discerned. Some researchers have regarded mental representations in terms of abstract schemata, frames, patterns or mental models, while others have paid attention to semantic information and propositional nature of mental representations. These differential conceptualisations have, in general, been driven by distinct psychological paradigms adopted, such as Associationism and Connectionism, Behaviourism, Gestaltism, and Cognitivism.

GOMS and ACT-based procedural transfer theses are a good example of modern explanations fitting the atomistic and mechanistic nature of the Connectionist paradigm, *i.e.*, by seeing transfer as an effect of commonality in semantic conditions-action-goal structures, mainly instantiated as If-Then production rule associations overlap. This view on transfer clearly replaced Behaviourist explanatory concepts of stimuli and response with more sophisticated mental concepts that serve as units of transfer. The cognitive architecture background also added important processing capabilities and some degree of flexibility concerning the identity constraint (*e.g.*, declarative-to-procedural, and declarative-to-declarative transfer). It did not, however, essentially defy the common underlying common element-based thought model of transfer.

Both the original habitual response-based idea of common element transfer as well as the modern production rule compilation and knowledge encapsulation account are in their core assumptions refuted by Gestalists' theories. Koffka's (1925) scrutiny of Thorndike's (1911, 1913) and Köhler's (1917) arguments and findings revealed that explanations of learning and transfer based on the notions of association and automation fall short of explicating the nature of mental activity even for simple problem-solving tasks. Novel explanatory concepts were needed to account for "learning by understanding" (Katona, 1940) and problem-solving transfer (Mayer and Wittrock, 1996). These were found with reference to the organisation and structure of knowledge, abstraction and general principle inferences, the goal- and meaning-directedness of thinking and its holistic nature (Bühler, 1907, 1908a; Holyoak, 1985; Humphrey, 1924; Selz, 1913, 1922), and functional relations (Duncker, 1935; Köhler, 1917). Because this tradition of investigating transfer is based on Gestaltist ideas, they could be summarised under the header of schema-based theories of transfer.

In accord with the traditions regarding research on mental representation, two mainstream explanatory models for transfer can be concluded to date. One is the model of *common element-based* transfer, rooting in Thorndikean ideas, which explains transfer as confined to elementary correspondences between a primary and a secondary learning situation, such as procedures and their automated effect. The other model emerging from the Gestalt tradition can be labelled *schema-based* or analogical transfer, emphasizing elementary loosened structural or principle/rule-based coherence between transfer source and target. They continued Judd's (1908) line of work, resulting in further accentuation of "insightful" transfer, using terms like knowledge structures and schemata, solution principles, and functionality. The problem is that as far as *transfer of learning* in both traditions refers to one and the same phenomenon, there can not be a situation with two incompatible theoretical frameworks standing side-by-side. Conceptual resolution in some form is clearly imperative. Several efforts have been made in recent years to review and revive transfer research, and to resolve controversies (cf. the content- and apperception-based approach: Helfenstein, 2005), but empirical justification is still in early stages.

4

Theoretical Model of Education

OVERVIEW

In order to present a model of how learning Statistics is derived from statistical activity, it is important for me to explain both the context of the learning I am investigating and the theory by which I interpret the findings. The scene for my two investigations. The research tools I use, such as naturalistic inquiry, phenomenography and statistical analyses, provide the means for investigating local occurrences. I use these tools to explore relationships and events as they occurred for particular individuals in a setting which was bounded spatially and in time.

It is by means of the theoretical framework, that is, by my application of activity theory, that I try to provide insights that transcend the particular context. To start off, I locate frameworks which draw on Vygotsky's theory in terms of some other major theories of education, particularly those which are currently important to research in mathematics education. An outline of activity theory, as expounded by Leont'ev. I introduce my approach to understanding students learning Statistics from an activity theory perspective.

INNOVATION, RESEARCH AND DEVELOPMENT

Research as a means of renovation and renewal of educational processes will be undertaken by all higher technical institutions. It will primarily aim at producing quality manpower capable of taking up R & D functions. Research for development will focus on improving present technologies, developing new indigenous ones and enhancing production and productivity. A suitable system

for watching and forecasting technology will be set up. The scope for cooperation, collaboration and networking relationships between institutions at various levels and with the user systems will be utilised. Proper maintenance, and an attitude of innovation and improvement will be promoted systematically.

PROMOTING EFFICIENCY AND EFFECTIVENESS AT ALL LEVELS

As technical and management education is expensive, the following major steps will be taken for cost-effectiveness and to promote excellence:

- High priority will be given to modernisation and removal of obsolescence. However, modernisation will be undertaken to enhance functional efficiency and not for its own sake or as a status symbol:
- Institutions will be encouraged to generate resources using their capacities to provide services to the community and industry. They will be equipped with up-to-date learning resources, library and computer facilities:
- Adequate hostel accommodation will be provided, specially for girls. Facilities for sports, creative work and cultural activities will be expanded:
- More effective procedures will be adopted in the recruitment of staff. Career opportunities, service conditions, consultancy norms and other perquisites will be improved.
- Teachers will have multiple roles to perform: teaching, research, development of learning resource material, extension, and managing the institution. Initial and in-service training will be made mandatory for faculty members and adequate training reserves will be provided. Staff Development Programmes will be integrated at the State, and coordinated at Regional and National levels.
- The curricula of technical and management programmes will be targetted on, current as well as the projected needs of industry or user systems. Active interaction between technical or management institutions and industry will be promoted in programme planning and implementation, exchange of personnel, training facilities and resources, research and consultancy and other areas of mutual interest.
- Excellence in performance of institutions and individuals will be recognised and rewarded. The emergence of substandard and institutions will be checked. A climate conducive to excellence and innovation will be promoted with full involvement of the faculty.
- Select institutions will be awarded academic, administrative and financial autonomy of varying degrees, building in safeguards with respect to accountability.
- Networking systems will have to be established between technical education and industry, R D organisations, programmes of rural and community development, and with other sectors of education with complementary characteristics.

MANAGEMENT FUNCTIONS AND CHANGE

In view of the likely emergence of changes in management systems and the need to equip students with the ability to cope with them, effective mechanisms will be devised to understand the nature and direction of change per se and to develop the important skill of managing change. In view of the integrated nature of the task, the Ministry of Human Resource Development will coordinate the balanced development of engineering, vocational and management education as well as the education of technicians and craftsmen. Professional societies will be encouraged and enabled to perform their due role in the advancement of technical and management education. The All India Council for Technical Education will be vested with statutory authority for planning, formulation and the maintenance of norms and standards, accreditation, funding of priority areas, monitoring and evaluation, maintaining parity of certification and awards and ensuring the coordinated and integrated development of technical and management education. Mandatory periodic evaluation will be carried out by a duly constituted Accreditation Board. In the interests of maintaining standards and for several other valid reasons, the commercialisation of technical and professional education will be curbed. An alternative system will be devised to involve private and voluntary effort in this sector of education, in conformity with accepted norms and goals.

THE MANAGEMENT OF EDUCATION

An overhaul of the system of planning and the management of education will receive high priority.

The guiding considerations will be:

- Evolving a long-term planning and management perspective of education and its integration with the country's developmental and manpower needs;
- Decentralisation and the creation of a spirit of autonomy for educational institutions;
- Giving pre-eminence to people's involvement, including association of non-governmental agencies and voluntary effort;
- Inducting more women in the planning and management of education;
- Establishing the principle of accountability in relation to given objectives and norms.

National Level

The Central Advisory Board of Education will play a pivotal role in reviewing educational development, determining the changes required to improve the system and monitoring implementation. It will function through appropriate Committees and other mechanisms created to ensure contact with, and coordination among, the various areas of Human Resource Development. The Departments of Education at the Centre and in the States will be strengthened through the involvement of professionals.

Indian Education Service

A proper management structure in education will entail the establishment of the Indian Education Service as an All-India Service. It will bring a, national perspective to this vital sector. The basic principles, functions and procedures of recruitment to this service will be decided in consultation with the State Governments.

State Level

State Governments may establish State Advisory Boards of Education on the lines of CABE. Effective measures should be taken to integrate mechanisms in the various State departments concerned with Human Resource Development. Special attention will be paid to the training of educational planners, administrators and heads of institutions. Institutional arrangements for this purpose should be set up in stages.

District and Local Level

District Boards of Education will be created to manage education up to the higher secondary level. State Governments will attend to this aspect with all possible expedition. Within a multi-level framework of educational development, Central, State, District and Local level agencies will participate in planning, coordination, monitoring and evaluation. A very important role must be assigned to the head of an educational institution. Heads will be specially selected and trained. School complexes will be promoted on a flexible pattern so as to serve as networks of institutions and synergic alliances to encourage professionalism among teachers, to ensure observance of norms of conduct and to enable the sharing of experiences and facilities. It is expected that a developed system of school complexes will take over much of the inspection functions in due course. Local communities, through appropriate bodies, will be assigned a major role in programmes of school improvement.

Voluntary Agencies and Aided Institutions

Non-government and voluntary effort including social activist groups will be encouraged, subject to proper management, and financial assistance provided. At the same time, steps will be taken to prevent the establishment of institutions set up to commercialise education.

Resources and Review

The Education Commission of 1964-66, the National Education Policy of 1968 and practically all others concerned with education have stressed that the egalitarian goals and the Practical, development-oriented objectives of Indian society can be realised only by making investments in education of an order commensurate with the nature and dimensions of the task. Resources, to the extent possible, will be raised by mobilising donations, asking the beneficiary communities to maintain

school buildings and supplies of some consumables, raising fees at the higher levels of education and effecting some savings by the efficient use of facilities. Institutions involved with research and the development of technical and scientific manpower should also mobilize some funds by levying access or charge on the user agencies, including Government departments, and entrepreneurs. All these measures will be taken not only to reduce the burden on State resources but also for creating a greater sense of responsibility within the educational system. However, such measures will contribute only marginally to the total funding. The Government and the community in general will find funds for such programmes as: the universalisation of elementary education; liquidating illiteracy; equality of access to educational opportunities to all parts throughout the country; enhancing the social relevance, quality and functional effectiveness of educational programmes; generating knowledge and developing technologies in scientific fields crucial to self-sustaining economic development; and creating a critical consciousness of the values and imperatives of national survival.

The deleterious consequences of non-investment or inadequate investment in education are indeed very serious. Similarly, the cost of neglecting vocational and technical education and of research is also unacceptable. Sub-optimal Performance in these fields could cause irreparable damage to the Indian economy. The network of institutions set up from time to time since Independence to facilitate the application of science and technology would need to be substantially and expeditiously updated, since they are fast becoming obsolete. In view of these imperatives, education will be treated as a crucial area of investment for national development and survival. The National policy on Education, 1968, had laid down that the investment on education be gradually increased to reach a level of expenditure of 6 per cent of the national income as early as possible. Since the actual level of investment has remained far short of that target, it is important that greater determination be shown now to find the funds for the programmes laid down in this Policy. While the actual requirements will be Computed from time to time on the basis of monitoring and review, the outlay on education will be shaped up to the extent essential for policy implementation in the Seventh plan. It will be ensured that from the Eighth Five Year Plan onwards it will uniformly exceed to 6 per cent of the National income.

Review

The implementation of the various parameters of the New Policy must be reviewed every five years. Appraisals at short intervals will also be made to ascertain the progress of implementation and the trends emerging from time to time.

The Future

The future shape of education in India is too complex to envision with precision. Yet, given our tradition which has almost always put a high premium on intellectual and spiritual attainment, we are bound to succeed in achieving

our objectives. The main task is to strengthen the base of the pyramid, which might come close to a billion people at the turn of the century. Equally, it is important to ensure that those at the top of the pyramid are among the best in the world. Our cultural well-springs had taken good care of both ends in the past; the skew set in with foreign domination and influence. It should now be possible to further intensify the nation-wide effort in Human Resource Development, with Education playing its multifaceted role.

TECHNICAL EDUCATION

From the first Five Year Plan onwards India's emphasis was to develop a pool of scientifically inclined manpower. India's National Policy on Education (NPE) provisioned for an apex body for regulation and development of higher technical education, which came into being as the All India Council for Technical Education (AICTE) in 1987 through an act of the Indian parliament. At the level of the centre the Indian Institutes of Technology and the Indian Institutes of Information Technology are deemed of national importance. The Indian Institutes of Management are also among the nation's premier education facilities. Several Regional Engineering Colleges (REC) have been converted into National Institutes of Technology. The UGC has inter-university centres at a number of locations throughout India to promote common research, eg. the Nuclear Science Centre at the Jawaharlal Nehru University, New Delhi.

LITERACY

2001 government statistics hold the national literacy to be around 64.84 per cent. Government statistics of 2001 also hold that the rate of increase of literacy is more in rural areas than in urban areas. Female literacy was at a national average of 53.63 per cent whereas the male literacy was 75.26 per cent. Within the Indian states, Kerala has shown the highest literacy rates of 90.02 per cent whereas Bihar averaged lower than 50 per cent literacy, the lowest in India. The 2001 statistics also indicated that the total number of 'absolute non-literates' in the country was 304 million..

Attainment

World Bank statistics found that fewer than 40 per cent of adolescents in India attend secondary schools. *The Economist* reports that half of 10-year-old rural children could not read at a basic level, over 60 per cent were unable to do division, and half dropped out by the age 14.

Only one in ten young people have access to tertiary education. Out of those who receive higher education, *Mercer Consulting* estimates that only a quarter of graduates are "employable". An optimistic estimate is that only one in five job-seekers in India has ever had any sort of vocational training.

Private Education

According to current estimates, 80 per cent of all schools are government schools making the government the major provider of education. However,

because of poor quality of public education, 27 per cent of Indian children are privately educated. According to some research, private schools often provide superior results at a fraction of the unit cost of government schools. However, others have suggested that private schools fail to provide education to the poorest families, a selective being only a fifth of the schools and have in the past ignored Court orders for their regulation. In their favour, it has been pointed out that private schools cover the entire curriculum and offer extra-curricular activities such as science fairs, general knowledge, sports, music and drama. The pupil teacher ratios are much better in private schools (1:31 to 1:37 for government schools and more teachers in private schools are female. There is some disagreement over which system has better educated teachers. According to the latest DISE survey, the percentage of untrained teachers (parateachers) is 54.91 per cent in private, compared to 44.88 per cent in government schools and only 2.32 per cent teachers in unaided schools receive inservice training compared to 43.44 per cent for government schools.

The competition in the school market is intense, yet most schools make profit. Even the poorest often go to private schools despite the fact that government schools are free. A study found that 65 per cent of schoolchildren in Hyderabad's slums attend private schools.

Private schools are often operating illegally. A 2001 study found that it takes 14 different licenses from four different authorities to open a private school in New Delhi and could take years if done legally. However, operation of unrecognized schools has been made illegal under the Children's Right to Free and Compulsory Education Act.

Rural Education

Following independence, India viewed education as an effective tool for bringing social change through community development. The administrative control was effectively initiated in the 1950s, when, in 1952, the government grouped villages under a Community Development Block—an authority under national programme which could control education in up to 100 villages. A Block Development Officer oversaw a geographical area of 150 square miles which could contain a population of as many as 70000 people.

Setty and Ross elaborate on the role of such programmes, themselves divided further into *individual-based*, *community based*, or the *Individual-cum-community-based*, in which microscopic levels of development are overseen at village level by an appointed worker:

The community development programmes comprise agriculture, animal husbandry, cooperation, rural industries, rural engineering (consisting of minor irrigation, roads, buildings), health and sanitation including family welfare, family planning, women welfare, child care and nutrition, education including adult education, social education and literacy, youth welfare and community organisation. In each of these areas of development there are several programmes, schemes and activities which are additive, expanding and tapering off covering the total community, some segments, or specific target populations such as small and marginal farmers, artisans, women and in general people below the poverty line.

Despite some setbacks the rural education programmes continued throughout the 1950s, with support from private institutions. A sizable network of rural education had been established by the time the *Gandhigram Rural Institute* was established and 5, 200 Community Development Blocks were established in India. Nursery schools, elementary schools, secondary school, and schools for adult education for women were set up. The government continued to view rural education as an agenda that could be relatively free from bureaucratic backlog and general stagnation. However, in some cases lack of financing balanced the gains made by rural education institutes of India.

Some ideas failed to find acceptability among India's poor and investments made by the government sometimes yielded little results. Today, government rural schools remain poorly funded and understaffed. Several foundations, such as the Rural Development Foundation (Hyderabad), actively build high-quality rural schools, but the number of students served is small.

Issues

One study found out that 25 per cent of public sector teachers and 40 per cent of public sector medical workers were absent during the survey. Among teachers who were paid to teach, absence rates ranged from 15 per cent in Maharashtra to 71 per cent in Bihar. Only 1 in nearly 3000 public school head teachers had ever dismissed a teacher for repeated absence. A study on teachers by Kremer *etc.*, found that 'only about half were teaching, during unannounced visits to a nationally representative sample of government primary schools in India.'

Modern education in India is often criticized for being based on rote learning rather than problem solving. *BusinessWeek* denigrates the Indian curriculum saying it revolves around rote learning. and ExpressIndia suggests that students are focused on cramming. A study of 188 government-run primary schools found that 59 per cent of the schools had no drinking water and 89 per cent had no toilets. 2003-04 data by National Institute of Educational Planning and Administration revealed that only 3.5 per cent of primary schools in Bihar and Chhattisgarh had toilets for girls. In Madhya Pradesh, Maharashtra, Andhra Pradesh, Gujarat, Rajasthan and Himachal Pradesh, rates were 12-16 per cent.

Fake degrees are a problem. One raid in Bihar found 0.1 million fake certificates. In February 2009, the University Grant Commission found 19 fake institutions operating in India. Only 16 per cent of manufacturers in India offer in-service training to their employees, compared with over 90 per cent in China.

Initiatives

Following India's independence a number of rules were formulated for the backward Scheduled Castes and the Scheduled Tribes of India, and in 1960 a list identifying 405 Scheduled Castes and 225 Scheduled Tribes was published by the central government. An amendment was made to the list in 1975, which identified 841 Scheduled Castes and 510 Scheduled Tribes. The total percentage of Scheduled Castes and Scheduled Tribes combined was found to be 22.5 per cent with the Scheduled Castes accounting for 17 per cent and the Scheduled

Tribes accounting for the remaining 7.5 per cent. Following the report many Scheduled Castes and Scheduled Tribes increasingly referred to themselves as *Dalit*, a Marathi language terminology used by B. R. Ambedkar which literally means “oppressed”.

The Scheduled Castes and Scheduled Tribes are provided for in many of India’s educational programmes. Special reservations are also provided for the Scheduled Castes and Scheduled Tribes in India, eg. a reservation of 15 per cent in *Kendriya Vidyalaya* for Scheduled Castes and another reservation of 7.5 per cent in *Kendriya Vidyalaya* for Scheduled Tribes. Similar reservations are held by the Scheduled Castes and Scheduled Tribes in many schemes and educational facilities in India. The remote and far-flung regions of North East India are provided for under the Non-Lapsable Central pool of Resources (NLCPR) since 1998-1999. The NLCPR aims to provide funds for infrastructure development in these remote areas.

The government objective for the *Sarva Shiksha Abhiyan* (SSA), started in 2001, is to provide education to children between 6–14 years by 2010. The programme focuses specially on girls and children with challenged social or financial backgrounds. The SSA also aims to provide practical infrastructure and relevant source material in form of free textbooks to children in remote areas. The SSA also aims at widening computer education in rural areas. SSA is currently working with Agastya International Foundation—an educational NGO—to augment its efforts in making science curriculum current and exciting. However, some objectives of the SSA, eg. enrollment of all children under the scheme in schools by 2005 remain unfulfilled. Education Guarantee Scheme and Alternative and Innovative Education are components of the SSA.

Women from remote, underdeveloped areas or from weaker social groups in Andhra Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Gujarat, Uttar Pradesh, and Uttarakhand, fall under the *Mahila Samakhyas Scheme*, initiated in 1989. Apart from provisions for education this programme also aims to raise awareness by holding meetings and seminars at rural levels. The government allowed 340 million rupees during 2007–08 to carry out this scheme over 83 districts including more than 21, 000 villages.

Currently there are 68 *Bal Bhavans* and 10 *Bal Kendra* affiliated to the *National Bal Bhavan*. The scheme involves educational and social activities and recognising children with a marked talent for a particular educational stream. A number of programmes and activities are held under this scheme, which also involves cultural exchanges and participation in several international forums.

India’s minorities, especially the ones considered ‘educationally backward’ by the government, are provided for in the 1992 amendment of the Indian National Policy on Education (NPE). The government initiated the Scheme of Area Intensive Programme for Educationally Backward Minorities and Scheme of Financial Assistance or Modernisation of Madarsa Education as part of its revised Programme of Action (1992). Both these schemes were started nationwide by 1994. In 2004 the Indian parliament allowed an act which enabled minority education establishments to seek university affiliations if they passed the required norms.

Women's Education

Women have much lower literacy rate. Compared to boys, far fewer girls are enrolled in the schools, and many of them drop out. According to a 1998 report by U.S., Department of Commerce, the chief barrier to female education in India are inadequate school facilities (such as sanitary facilities), shortage of female teachers and gender bias in curriculum (majority of the female characters being depicted as weak and helpless)

The number of literate women among the female population of India was between 2-6 per cent from the British Raj onwards to the formation of the Republic of India in 1947. Concerted efforts led to improvement from 15.3 per cent in 1961 to 28.5 per cent in 1981. By 2001 literacy for women had exceeded 50 per cent of the overall female population, though these statistics were still very low compared to world standards and even male literacy within India. Recently the Indian government has launched Saakshar Bharat Mission for Female Literacy. This mission aims to bring down female illiteracy by half of its present level.

Sita Anantha Raman outlines the progress of women's education in India:

Sita Anantha Raman also maintains that while the educated Indian women workforce maintains professionalism, the men outnumber them in most fields and, in some cases, receive higher income for the same positions.

COMPARISON WITH OTHER THEORETICAL APPROACHES TO LEARNING

Western researchers are increasingly finding that a Vygotskian perspective provides a helpful lens with which to view the complexities of mathematical learning. This approach takes into account the fundamental role of social interactions and historical or cultural influences on learning. It aims to understand how language and symbols mediate meaning. Vygotsky's work on cognitive development contributed to the evolution of cognitive psychology. In this framework, not only are the actions of learners important but also their goals and how the actions are situated in a sociohistorical context.

For Vygotsky and the activity theorists who followed him, the context for all activity is important, and collective external activity precedes individual internal activity. The emphasis on the melding of the individual with society is particularly relevant to the analysis of adult learning, as adults are cognitively fully developed in the biological sense but generate new knowledge through participation in activities which are socially and culturally rooted. Hence, while Vygotsky's interest was mainly in the development of the child his explanation of learning through interpersonal interactions, and Leont'ev's interpretations and ideas, are useful for extending research on adult development.

The Vygotskian framework provided a stimulus for theories of situated cognition in which a setting is defined as the relationship between an actor and the arena in which she or he acts. Cognitive skills take shape in the course of individual participation in socially organised practices. Research into situated

learning recognises the cultural dimensions of learning and practices, for example, the cultural aspects of literacy; numeracy; apprenticeship and interactive expertise or working intelligence. Issues addressed by researchers working in this paradigm often concern the effects of cultural artefacts—the devices and technologies, such as computers or internet systems, through which we “manipulate reality”. Varela et al propose that knowledge is “amplified” by technology.

To them, knowledge is seen as:

- Tangibly and inextricably linked to a technology that transforms the social practices which make that very knowledge possible.

These issues are highly pertinent to a study of statistical learning, as statistics is an artefact of Western culture. It is linked to our technology and it both moulds our thinking—the way we understand our world—and is used to produce changes in our environment. Theories of situated cognition resonate with activity theory approaches in their recognition of cognition as constituted in the social, vocational and cultural life of people. Consonant with Leont’ev’s theory research in this area acknowledges the role of tools in mediating cognition. However, in theories of situated learning, consideration is given to the importance of informal learning, an area little addressed by Vygotsky or Leont’ev.

One of the strengths of the conceptual frameworks provided by Vygotsky and Leont’ev is the integration of affective and motivational dimensions into explanations of cognition. There have been many researchers in diverse areas of education, who seek to show that motivational goals and intentions give meaning to learning—they are what drives the process. For example, Ausubel, Novak and Hanesian characterise all learning as meaningful learning.

Ames and Ames argue that goals:

- Provide the mechanism for filtering perceptions and other cognitive processes.

Bandura explains the link between intentions and behaviour by means of the construct of self efficacy:

- The conviction that one can successfully execute behaviour.

Studies by Volet; Volet and Chalmers and Volet and Lawrence show the importance of goals as mediators of university students’ learning. Education research increasingly recognises that the attitudes, beliefs, motivation and intentions expressed by learners are important, not only for understanding the actions of those learners, but also for the insights provided into cognitive theory. However, much of the literature in the area of affect and motivation lacks a unifying theory. In Leont’ev’s theory, the role of motivation and of goals in cognitive processes is systematised by means of his three levels of analysis of activity.

In mathematics education, research into affect and related areas, such as beliefs and perceptions, is extensive. The breadth and depth of these studies reflect an awareness of the importance of charting the changing trends and many dimensions of affect in learning. For example, Mcleod reviewed the research since 1970 in the *Journal for Research in Mathematics Education* on affective issues in mathematics learning, showing that such studies are central

to the goals of mathematics education. These studies explore many different aspects of the affective domain. One major area of interest to mathematics educators is that of students' attitudes to learning mathematics, particularly gender effects. Fennema summarises work using attitude scales, such as the Fennema-Sherman Scale, for measuring gender effects in affective issues and achievement in mathematics.

Her research showed major differences between males and females on a number of variables, such as confidence in learning mathematics, or perceived usefulness of mathematics. Recent work on the Fennema-Sherman Scale by Forgasz, Leder, and Gardner suggests that changes in response patterns challenge the reliance that has been placed on this important instrument. They recommend revising it, particularly the scale referring to mathematics as a male domain. This indicates that important transformations are taking place in students' attitudes to mathematics. An area of research related to attitude studies concerns students' perceptions and beliefs about mathematics. Schoenfeld pointed out that students' performances on mathematical problems were often undermined by their beliefs about mathematics, such as the belief that a mathematical problem should always yield a solution quickly.

There have also been recent studies on factors affecting students' motivation to learn mathematics showing that classroom environment, goal setting and type of task are critical elements. Research in statistics education, too, confirms the importance of students' attitudes, beliefs, interests, expectations and motivation to their learning. Affective issues are related to the ways in which students evaluate and regulate their learning—key elements in defining their activities. In this regard, a helpful distinction was made by Semenov, a Soviet psychologist, who applied activity theory to the study of thought processes. He distinguished the “intellectual plane of thought”, which pertains to the development of the content of a problem, from the “personal plane of thought”, which refers to the individual's evaluation of his or her efforts—reflections on the meaning and success of the ongoing mental activity.

While Semenov was referring to problem solving, his distinction extends usefully to students' appraisals of studying a statistics course. In my project I will differentiate between students' so called “objective” or practical evaluations of Statistics—evaluations in terms of extrinsic and culturally framed factors such as jobs, or higher study, and their personal assessment of it in terms of their liking for or interest in it and feelings about learning it.

A framework for the role of values in learning mathematics was developed by Southwell. This extends McLeod's research on the relationship between beliefs, attitudes and emotions in mathematics education. Southwell sees values as closely related to beliefs but “more complicated and encompassing”. She denotes values by a triangle consisting of the three elements of valuing: cognition, affect and volition.

She does not distinguish between values and valuing, which renders her framework problematic to me. However, the three aspects of valuing she specifies, tie in with Semenov's notion that the plane of thought has intellectual

and personal aspects. Southwell's notion that volition is an aspect of valuing also accords with Leont'ev's insistence that activity is purposeful. Leont'ev proposes that need always stands behind thought or action. However, unlike Southwell, Leont'ev explains how purpose, needs and goals are socioculturally framed.

That is, he explicates these relations in terms of individual's activities, rather than simply stating that such relations exist. The focus on learning as "embedded in social situations, practices and cultures" is one of the key elements differentiating activity theory from constructivism, a major theory in mathematics education.

While activity theorists assert that all learning is socially constituted, constructivism emphasises that all learning is the construction of meaning by the individual. In both cases action is required on the part of the learner. Constructivist ideas are drawn initially from Piaget's work, but constructivism has developed in various forms, such as radical constructivism or social constructivism.

Constructivist thinking has been instrumental in challenging the way educators regard learning—and therefore teaching. Piaget's work led to the idea that a mathematics classroom could be a place where children could direct their own learning, pose their own problems and discover their own mathematics. The impact of these ideas on research into mathematics education has been extensive, so much so that Ellerton asks whether we have become too comfortable with constructivism. What do we really mean by the constructivist teacher?

Relation between Constructivism and Vygotskian Approaches

Vygotskian perspectives are often contrasted with theories of learning based on constructivism. A Piagetian approach considers learning as the result of individual constructions of the environment, namely assimilation and accommodation. Assimilation is the process whereby the individual integrates new perceptions or situations into her or his existing individual schemes, and accommodation is the individual's effort to adjust schemes to the environment. The essence of this approach is the focus on the individual and on stages of maturation as prerequisites for the development of mental facilities.

Vygotsky recognised the genius of Piaget's work and was influenced by it, though disagreeing with Piaget's conception of:

- The role of egocentrism in the developmental relationship of language and thought.

According to Vygotsky:

- The developmental uniformities established by Piaget apply to the given milieu, under the conditions of Piaget's study. They are not laws of nature but are historically and socially determined.

Thus Vygotsky criticised Piaget for his failure:

- To take into account the importance of the social situation and milieu.

Piaget, in turn, was aware of Vygotsky's theories. Indeed, Piaget modified some of his theories in the light of Vygotsky's criticisms. However, Bodrova

and Leong point out that this happened after Vygotsky's death. For this reason, the works of Vygotsky's students, more than of Vygotsky himself, have some common ground with Piaget's ideas.

Bodrova and Leong express the opinion that this:

- Has caused many psychologists to erroneously consider the Vygotskian framework as part of Piaget's constructivist tradition.

Piaget, like Vygotsky, explained cognitive development, such as mathematical development, as a result of children interacting with their environments. However, while Piaget viewed learning as subordinate to development, Vygotsky insisted that learning, by which he meant formal or school learning, directly influences development.

According to Vygotsky:

- Instruction is one of the principal sources of a schoolchild's concepts and is also a powerful force in directing their evolution; it determines the fate of his total mental development.

To Vygotsky, thinking itself, together with the cognitive structure required for thought and indivisible from the function of that thinking, is generated by internalisation of social relations. Meaning making takes on different forms in the interpretation by constructivists and Vygotskian theorists. In the former, it is a personal contribution of the learner who is involved in the education process.

In a Vygotskian approach, meaning making is bound up with cultural values, such that:

- The qualities of thinking are actually generated by the organizational features of the social interaction.

Vygotsky explained that higher mental processes develop through interaction with others.

He expressed this as follows:

- From the very first days of the child's development his activities acquire a meaning of their own in a system of social behaviour and, being directed towards a definite purpose, are refracted through the prism of the child's environment. The path from object to child and from child to object passes through another person. This complex human structure is the product of a developmental process deeply rooted in the links between individual and social history.

Knowledge to a constructivist is an individual construction; to the activity theorist it is a collective representation. This is not to intimate that constructivists deny the importance of the societal context, nor that there is no place for the individual in the Vygotskian viewpoint. Rather it is a shift in emphasis.

Saxe suggests of the Piagetian perspective:

- Social life is related to cognitive development as an external process, and the way sociocultural life may be deeply interwoven with the character of intellectual functioning is unanalysed.

In contrast, Bauersfeld calls activity theory a prototype of collectivist perspectives. A simplified overview of this perspective, provided by Bauersfeld is that learning is enculturation into pre-existing societal structures. This suggests

a ready made world and knowledge, a notion for which activity theory is criticised. This enculturation is not a passive process. The individual develops through effective participation in activities. In contemporary research the term “appropriate” is used rather than “internalise” to emphasise the active role of the learner.

Radical constructivism, developed by Von Glasersfeld, has been criticised for studying:

- Human mental functioning as if it exists in a cultural, institutional and historical vacuum.

To its critics, radical constructivism presents a view of the human being as a closed system: “self-organising, self regulating, self-contained”. Communication is problematic in this approach with meanings “taken as shared” rather than shared.

There have been attempts to integrate social aspects in accounts of the construction of mathematical knowledge. These add on to radical constructivist perspectives by acknowledging the “important but secondary” place of social interactions in knowledge construction. Lerman argues that adding the “social” to constructivism leads to incoherence. It fails to account for how people understand each other, or to explain the social dimension in a personal world.

Lerman proposes that the Vygotskian approach presents a different world view to the mentalism that underlies constructivist thinking, one in which:

- It is necessary to recognize the shift from a view of the autonomous cognizing subject constructing her or his subjectivity and knowing to one of the construction of human consciousness in and through communication.

Hence, the difference in thinking between Piaget’s and Vygotsky’s followers does not simply lie in the latter taking greater account of social interactions, as social constructivists do, anyway. Rather it is in acknowledging the primary sense in which subjectivities and positionings are constituted and reconstituted by the social events and cultural history surrounding the individual. To activity theorists, socially and culturally linked goals and needs are seen as integral to cognition, rather than as the “interference” of subordinate issues.

Ernest proposes that any form of constructivism retains portions of the radical constructivism metaphor of an:

- Evolving and adapting, but isolated organism, a cognitive alien in an hostile environment.

Hence the individual’s cognition takes place in a private domain of experience. Transference from the public or social realm to this personal domain cannot be explained. This problem is not, however, restricted to constructivism. Davydov an important student of Leont’ev, postulates that the structural difference between individual and collective activity is also an unsolved problem of activity theory.

The two poles of thought represented by constructivism and Vygotskian approaches are major current theories which have in common a rejection of the transmission view of teaching and learning. They both focus on the actions of the individual in learning. Their points of difference have led to a multiplicity of models. Current approaches include: synthesising the two approaches

superseding models and emerging connectionist theories of cognition or enactivism. One example of a middle position between individualism and collectivism is an “interactionist” perspective.

It takes the position that the culture of the classroom is constituted in social interactions among teachers and students. Another strategy has been to adopt complementary perspectives. Bartolini Bussi argues that rigid adherence to the principles of constructivism or to a Vygotskian perspective does not recognise the richness and complexity of the ideas of the founders. Moreover she feels that theoretical coherence should not take precedence over real life problems. Indeed Bartolini Bussi moves that such a pragmatic view is “deeply Vygotskian”, as Vygotsky himself was concerned with pressing social and cultural issues, rather than theorising. Lerman presents a critique of this view, arguing that adding bits of one theory to another, or slipping from one to the other, ignoring the contradictions, or plastering over theoretical holes in each, do not do justice to the insights and coherence of either.

There is considerable debate between protagonists of Vygotskian approaches and those of other current theories. I believe that the usefulness of activity theory lies in its systemic approach. Activity theory posits a view of learning in which personal experiences, goals, subjective perceptions and sociohistorical factors are interwoven. Rather than focusing on separate facets of learning and context, activity theory implies a commitment to investigating the learning process as a “dynamic system of meaning” in which intellect and affect unite and through which society and the individual interact and evolve. This view of learning includes notions of growth and diversity.

SOME INFLUENCES ON THE THEORY OF ACTIVITY

In developing a Marxist psychology, Leont’ev drew on the work of many philosophers, such as Marx himself and Engels, and of psychologists, particularly Rubinshtein and Vygotsky. Leont’ev’s orientation to Marxism is a critical element in his theories about human consciousness and cognition. He explained the revolution brought about by Marx in the theory of cognition in terms of the role Marx ascribed to human practice in cognition. That is, Leont’ev stressed that to Marx cognition and activity were inseparable.

Leont’ev wrote:

- In reality the philosophic discovery of Marx consists not in identifying practice with cognition but in recognising that cognition does not exist outside the life process that in its very nature is a material, practical process.

Leont’ev concurred with Vygotsky who was convinced of the Marxian concept that the “human essence is constituted by social relations”. That is, awareness, thought and other higher psychological functions, arise and develop in the interactions among people and their ties to the world in which they live. In Marx’ philosophy, the object of knowledge is to transform the world, not just to understand it. In Soviet education, these ideas were translated into attempts “to construct a new socialist man”. Both Vygotsky and Leont’ev built their psychology on a conception of Man developed by Engels and Marx.

This conception is expressed by Mellin-Olsen as follows:

- The conception is one of man as an acting person, at one time being both determined by history and determining it, being both created by society and creating it.

It was in this context of historical and dialectical materialism that Leont'ev considered activity as an object for psychology. Leont'ev's formulation of activity owes much to his many debates with Rubinshtein. Rubinshtein, who lived from 1889 to 1960 explored the 'mind body' problem stressing that activity is not only external behaviour but is inseparably linked with consciousness.

He expressed this in the formula:

- External causes act through internal conditions.

Leont'ev disagreed with Rubinshtein in that the latter considered that practical activity was the subject of study for psychology only to the extent that such activity included internal mental processes, such as perception or thinking. Leont'ev characterised this as a one sided view, in which mental activity is seen as directing physical activity, or external activity is viewed as dependent on psychological images. In Leont'ev's view, the "circle" of mental processes opens up "to meet" the external world of objects through external practical processes or activity. For example, bouncing a ball leads to a perception of its resilience.

To Leont'ev the function of activity is "transforming this reality into the form of subjectivity". That is, activity enters psychology not as one of its elements, nor as an aspect of internal processes, but through its function—the function of linking the individual's external and internal worlds. At the early stages of its development, activity must have an external form. Activity develops through reflection and regulation. Through processes of interacting with others and the environment, mental images and thoughts take place. According to Leont'ev these "deflect, change and enrich this activity".

Vygotsky's ideas and images permeate activity theory as a melody runs through a complex orchestrated score, with the harmonies, counterpoint, new melodies and even discordant notes, being provided by his students, mainly Leont'ev and Luria. It is therefore important for me to interpret Vygotsky's notions as they apply to activity theory in general and to my application of it in particular.

Vygotsky did not himself develop the concept of activity as a theoretical construct. However, he conducted empirical investigations based on the assumption of activity, emphasising the role of speech and semiotics in causing

Fundamental changes to the nature of the activity. According to Davydov and Radzikhovskii:

- The true methodological significance of Vygotsky's work consists of the assertion that activity is the explanatory principle in psychological theory.

This remark suggests that Vygotsky adopted Marx' approach to formulating a new psychology. In the last years of his short life, however, Vygotsky moved away from strict adherence to Marxist principles—at least this was the view of the Soviet authorities—resulting in his works being banned for many years in

the Soviet Union. Some of Vygotsky's colleagues and students, including Leont'ev, went on to interpret and propagate Vygotsky's sociohistorical theory of psychology within a Marxist framework, linking individual consciousness and personality with social and practical activities.

OUTLINE OF LEONT'EV'S ACTIVITY THEORY

Wertsch, commenting on Leont'ev's exposition of the tenets of activity theory summarises three major original contributions of Leont'ev to the works of Vygotsky and other theorists. The first of these is the construct of activity itself. Secondly, Leont'ev presents levels of analysis of human activity, arguing that activity can be viewed from the perspective of the milieu or context in which it takes place, from the goal directed actions which make up the activity and from the operations which depend on the conditions under which actions take place. Thirdly, Leont'ev replaces sign systems, which are central to Vygotsky's theories, with activity as the mediator between humans and their worlds. Thus an analysis of activity explains the dynamics of how humans relate to their physical and social environments.

Activity

Activity, as a construct, occupies a major explanatory role in the psychology that dominated the Soviet Union in the sixties and seventies.

The very process of living is described by Leont'ev as:

- The system of activities that succeed one another.

Activity refers to the functional unit of human behaviour that relates the individual to his or her social and cultural world. Leont'ev and his fellow activity theorists explain that humans understand their world and develop knowledge about it by acting purposefully in it. In turn this activity changes the world.

Leont'ev rejects "positivist" notions of activity which stress activity as purely adaptation to the external world. His main criticism of this perspective is that if psychology is limited to the concept of socialisation of individuals, the structure and transformations which link humans with their society will remain a mystery. To understand these links he posits that we must investigate activity—its structure, its specific dynamics and its various forms, both overt and cognitive.

The Structure of Activity

Leont'ev identified three levels of analysis of activity.

Further expansions were provided by Zinchenko and Gordon.

- The first level is concerned with the global aspect of activity. This defines activity as a unit of life mediated by reflection; a frame outlining the context in which the activity takes place, for example, play, formal education or work. This level identifies the socioculturally defined milieu in which the actions occur. At this level analysis is therefore concerned with the motivation underlying and engendering the actions, the "energising function" of the activity.
- The second level relates to the actions which make up and realise the activity: how the task was carried out. To Leont'ev, actions are always

directed towards a goal. He did not acknowledge that we sometimes do things without a conscious reason. He postulated that there may be many intermediate or partial goals to be satisfied on the way to achieving the final aim. These intermediate goals are determined consciously and with regard to the social relations in which they are set. Leont'ev gives the example of individuals beating the bushes to scare out an animal which will be caught by other, strategically placed, members of the community. The actions of beating the bushes do not in themselves have direct relevance to satisfying hunger, the motive of the activity. It is the connection of these actions to those of others and to the main purpose of the exercise which explain the actions.

- As outlined by Leont'ev actions have an intentional aspect and an operational aspect and these are carried out to realise a conscious motive. The same motive can give rise to different goals and accordingly can produce different actions. Conversely the same actions can realise different activities. For example, a statistical procedure such as a "t - test" may be carried out by a student to get an answer, with little reflection about understanding the procedure while different goals may lead to the same actions being carried out but with the focus on the underlying rationale of the procedure.
- The means by which actions are carried out are labelled operations by Leont'ev. Operations are therefore components of actions. While actions are determined by the goals which they fulfil, operations depend on the conditions, especially the tools, which delineate the exact mechanisms for carrying out the action. Tools can be physical, or "extra-cerebral" for example, computers or calculators for carrying out statistical procedures. They can also be cognitive, for example an algorithm, followed mechanically in order to get a result. Leont'ev posits that it is the fate of operations to become automatic by their mechanisation. Operations, however, are inseparable from the actions and in turn the goals which they serve. They are under conscious control as part of the actions and, through these actions, the activity in which the individual is engaged. The issue here is that different conditions lead to different compositions of actions. Solving a linear algebraic equation, for example, may be performed on an operational plane if the student has practised the process many times but not if the student is a novice in algebra. This level of analysis is particularly pertinent to the analysis of learning Statistics where the aim of many students is to become familiar with, and so automate, processes and algorithms.

The implication of viewing activity from different levels is that these provide different vantage points for investigation. At the global level, Leont'ev distinguishes activities on the basis of motive and the object towards which they are oriented. This provides one vantage point from which to understand students' learning.

Activities are comprised of actions which are determined by the goals impelling them. Hence the conscious goals or needs driving the actions

provides another perspective for analysis. Actions, in turn, consist of operations where the notion of operation has to do with the routine automatic aspects of carrying out a task. This level of analysis, therefore, relates to the means or resources for carrying out the actions.

Dynamics

To Leont'ev, the problem of understanding the dynamics of activity, is one of discovering the relationships that connect the individual's behaviour with physiological functions, "the work of the brain". By this, Leont'ev is not proposing a quick course in neuro-physiology. Rather he suggests an indirect approach—investigating the functional development of the mechanisms in the brain as a product of activity. This analysis must include an understanding of both phylogenetic development, that is, development which is sociohistorical or evolutionary, and ontogenetic development—the maturing of the organism. Leont'ev posits that higher order mental functions take place as a result of "mastering tools and operations". These mental systems are instated by or generated by activity. This means that mental images are not formed by the brain; they are the function of the brain. They are generated in the transition from the "extracerebral to the intracerebral sphere". That is, there is no landing pad in the brain awaiting the arrival of images. It is by means of our actions, including mental actions such as reflection, that we transfer images from the external world to the cognitive sphere. Activity mediates between the environments surrounding humans and our internal domains.

Leont'ev stresses that activity is characterised, not by its units which are meaningless if studied in isolation, but by the systemic connections between the units and their transformations. That is, activity is not simply a sum of actions. Rather, the connections between the parts and the goal formation determine activity. The levels of activity are mobile or dynamic; actions can become activities in their own right. For example, driving a car is an activity if the person is learning to drive in order to pass a driving test.

It is purposeful, effortful action. The same actions—such as steering, braking, accelerating, may, however, be carried out as part of another activity, for example driving to work. Here the setting is work; the partial goal of the driving actions is to arrive at work—actions such as steering or braking, are the means of achieving this aim. Further, if the driver is experienced, the actions taken in driving may be automatic. They are now operations. However, in a difficult situation, such as a driver would experience in heavy traffic and wet conditions, conscious decisions will again regulate the actions, rather than a mechanical set of operations being performed.

The example illustrates that in the course of attaining an overall goal, activity may be split up into separate, successive actions which are consciously carried out with the help of operations which, in turn, may have been formed under different circumstances. The opposite happens when the individual is no longer conscious of intermediate results—the overt actions and mental reflection merge together or are consolidated in carrying out an activity.

According to Leont'ev, investigating both these aspects:

- The breaking down of the activity and the integration of its actions and operations, can only be done by studying the links. These may be all internal, as in cognitive activities, but, more often, internal activity is implemented by external actions.

The word “activity”, as used throughout this thesis, refers to this framework. That is, a student’s statistical activity encompasses her actions within a specific context, her goals, and the resources available to her, whether technological or her own expertise.

INVESTIGATIVE AND COMPARATIVE STUDIES

All fields of study appear to be marked by similar phases of growth. In the beginning, contributions to the field tend to be discrete and unsystematic, prompted by the curiosity of the observers and their inherent interest in the subject. There are no rules, just the special insights and motivations of single observers, whose accounts are descriptive and usually lack systematic reporting or an expressed framework of theory. As work in the field of study increases, reporting becomes more systematic and comprehensive, and the reporters are more self-conscious about the accuracy of their data and more concerned about the ways in which they arrive at conclusions from the data.

The curiosity of observers becomes more focused on the possibilities of practical applications of new knowledge, and they are inclined to be critical of their own work and that of their colleagues. Particular types of studies emerge, marked by particular theoretical approaches to the subject, characteristic ways of observing and reporting, and broad agreement on what is or is not relevant. Practitioners in the field become aware of the precedents and of their intellectual ancestors, as well as the kinds of effort their contemporaries are directing at similar targets of study.

Comparative education has demonstrated all these characteristics during its development. The literature includes a wide array of subjects and approaches, symptomatic of the varied motives for studying foreign educational systems. It encompasses narrative description of single nations prompted by interest and curiosity, selective and structured observations motivated by the desire to apply lessons from abroad to the solution of educational problems at home, and encyclopedic codification of the “facts” about many countries.

Such work may be impressionistic and even normative, providing a wealth of information and insights about the nations studied. In addition, it often reveals much about the culturally determined predilections of its authors. Historical reviews of the literature in comparative education show clearly that systematic studies of foreign education increased dramatically as nations began to develop their own public school systems.

Interest in foreign educational practices has been stimulated by nationalism, the growth in international communications, and the aftermath of major wars. For some, the motive was to help develop improved education modeled on foreign practices; for others, foreign study, travel, and teaching were seen as

means to ease tensions among nations and foster an international perspective. Two general questions have especially shaped the investigations of writers in comparative education: Why do educational thinking and practices differ among nations? What are the differences and similarities? The conceptual frame within which answers have been offered becomes evident from a brief review of the literature since the beginning of the 20th century, when Sadler emphasized the intimate and interactive relation of educational and historical facts.

EDUCATION SYSTEMS OF NATIONS

The education systems of nations differ because of different historical and cultural traditions, but they are similar because there are common elements in human societies. In addition, important events transcending national boundaries have influenced their affairs — the Protestant Revolution, Marxism, the Industrial Revolution, Imperialism (or the achievement of national independence from colonial control), for example. The interplay among such factors has occupied the attention of recent generations of comparative educators.

Comparative education writing has been influenced by several important perspectives. First, the realization that educational phenomena are part of the whole fabric of a nation's culture and history for the most part put an end to works that described and assessed schooling without reference to the larger cultural context of a country. Studies thereafter tended to set educational events against a historical background and to describe the genesis of different types of schools, educational philosophies, and school systems as parts of a series of political and social events. Kandel and Ulich, especially, focused upon the links among history, national culture, political ideology, and schooling.

Much attention was given to “national identity” as the key to understanding a nation's special educational characteristics. It was conceivable that this approach would end opportunities for comparison because of the tendency to assume that each nation and its education were unique. This danger was averted, however, by the great attention given to common factors and common problems presumed to affect many countries. The major assumption that characterized comparative education work during the first half of the 20th century was that such study could illuminate the past growth and current dynamics of educational change in whole societies.

It was not until after World War II, however, that the predominantly historical, philosophical, and theoretical approaches were challenged by more pragmatic considerations. Over a hundred years before, many writers had been prompted to study the schools in foreign countries with a view to improving classroom practices and school system policies in their own lands. From about 1950, this motive prompted a renewal of interest in comparative studies, whether in highly developed nations seeking a way out of the disorder of the postwar period or in the less developed world which was confronting the problems of newly achieved independence. Educational reform and planning for national survival and growth were everywhere of paramount importance.

Economists in particular led the move towards regarding the education system of a nation as its means for investing in human potential, as its way of developing

national resources. But the problems were not only economic. The survival of a nation depended as much on its success in dealing with political and social problems as on the most efficient allocation of human resources. For the first time, some nations began to regard reform in education as a possible means of achieving a sense of national unity among disparate sub-populations, a tool for ameliorating gross disparities in status and opportunity among social classes, and a mechanism for improving skills and the quality of life. To study the experience of nations other than one's own seemed pertinent. Comparative study of education and of those social, political, and economic dimensions of society closely bound up with education was encouraged by these developments.

The social sciences thus provided a leavening for the predominantly historical and philosophical approaches of earlier comparative educators. Contemporary work has developed a greater specificity of criteria and a sharper awareness of causal relations. The underlying general questions now tend to be restated more in the following form: What factors in the school system or in the social, political, or other structures of the society explain variability in pupil achievement, administrative structure, school financing, instructional methodology, and other educational phenomena? To the questions of what the similarities and differences in educational practices among nations are and what explains these similarities and differences, a third question was added: What are the outcomes of these similarities and differences?

Comparative educators have for a long time been especially concerned with the availability of data comparable across nations, with controlling the biases of observers and interpreters of data, and with integrating the data, concepts, and analytic techniques of several academic disciplines. The work of international organizations has greatly improved the availability and, to some extent, the comparability of data. Collaborative work involving persons from different nations and disciplines has strengthened the methodological grasp of the problems involved. Further, the use of statistical analysis, model theory, and systems analysis for the purposes of comparative education has been heralded by some practitioners as signifying the emergence of the field as a science.

As a result, a new kind of comparative education research has developed: the empirical cross-national study in which large amounts of data are gathered and analyzed and a variety of social science concepts and techniques are used to test hypotheses about the relations between educational variables and political, economic, and social characteristics. Interest in the methodological problems of cross-national comparison has been sharpened, and much attention has been given to the possibilities of using those strategies and tactics that had become commonplace in empirical social science research. International organizations, such as UNESCO and other specialized agencies of the United Nations, and the Organization for European Cooperation and Development (OECD) were able to collect educational and other social data systematically and on a vast scale.

These agencies have also made valuable contributions to educational planning and policy efforts, for example, the series of studies on educational finance and planning produced by the International Institute of Educational Planning (a

UNESCO agency), and a set of OECD country studies in which national policy and plans have been critically reviewed and analyzed by international teams of educational experts. Technical assistance programmes have encouraged the exchange of skilled professionals among developed and underdeveloped countries, and this has made evident the commonality and immediacy of socio-educational problems in many lands.

Thus the burgeoning of data sources, increasing methodological sophistication, the meshing of social science expertise with education, and the presence of urgent problems requiring attention at the national policy level all have combined to give renewed power and variety to comparative studies in education.

An excellent example of this type of work is the massive survey undertaken by the International Association for the Evaluation of Educational Achievement (the IEA project). This project has been devoted to cross-national assessment of student achievement in selected school subjects and attempts to explain variance in such achievement. The first project was a study of mathematics achievement in 12 countries. The most recent phases of work covered science, reading comprehension, and literature in 21 countries, and reports on three more school subjects — civic knowledge and English and French as foreign languages — are in preparation.

In addition, overall studies of the six-subject surveys are in preparation. Data were not, of course, collected merely on achievement. A vast amount of information in standardized form was obtained on student home background, school practices, teacher characteristics, and the nations' school systems, as well as selected social and economic data. Results were compared at three levels: among students, among schools, and among nations. The main statistical technique used for explaining variance in achievement was multiple regression. The problems inherent in the new wave of empirical cross-national research are somewhat different from those of the earlier generation of comparativists, but they are not altogether unique.

The latter could be faulted on grounds of personal or cultural subjectivity and bias, or because their global perspective was too theoretical, or because their descriptive detail was merely interesting or idiosyncratic and not generalizable. The more empirical studies, even when thoughtfully planned and rigorously executed, are subject to such familiar methodological criticisms as representativeness, the accuracy of data, and the appropriateness of analytical design. Two general concerns, however, are more important. First, the findings should have some relevance to decision making in education (whether at the national policy level or in the school or classroom in particular pedagogical terms), and second, the subtleties of human interaction in the teaching-learning process should not be neglected by undue emphasis upon easily quantifiable and more generally conventional dimensions of education.

In reference to the large-scale survey approach of IEA, the technical problems, while important, are not insuperable. If there is enough time, experience, cooperation among experts, and money, it is possible to reduce weaknesses in sampling, data collection, analysis, and inference to reasonable levels. Relating

comparative studies of this kind to policy is a more difficult task, however. At one level is the widespread problem of how to communicate scholarly research findings to practitioners; at another is the selection of problems for investigation and the search for relations among factors that bear upon important professional policy issues. The IEA study does achieve this to some extent.

For example, it illuminates the arguments over selective versus comprehensive schooling, documents and refines knowledge about the relation of sex of pupil to achievement in different subjects, and highlights the variable relations between school and home factors in accounting for pupil achievement in different subjects, at different ages, and in different countries. Furthermore, first attempts were made, notably in the literature and civic knowledge studies, to gather and to compare data on non-cognitive variables.

The trend of the past decade towards empirical, quantitative, large-scale research has not been without its severe critics. In drawing upon the quantitative techniques of economists, psychologists, sociologists, anthropologists, and political scientists, researchers run the risk of becoming distracted from those topics that are more central to educational studies: curriculum, teaching methodology, and classroom and school organization. Furthermore, it is argued, enthusiasts for empirical methodology may ignore its limitations as an investigative strategy. Critics also tend to stress the inappropriateness of applying models of investigation drawn from the physical sciences to the humane arts, such as education.

However, few practitioners are unaware of the differences in orientation inherent in the body of comparative studies: theoretical and practical, descriptive and analytical, objective and melioristic, philosophical-historical, and empirical. Each orientation has made and continues to make its own particular contribution to the understanding of data and educational problems.

But few researchers today will deny the complementary nature of the approaches that characterize the predominantly historical studies of the 1930s and 1940s and the empirical studies of the past decade. Schooling is a mass enterprise. As such there is value in analyzing its correlates and outcomes, using techniques of mass data collection and analysis. Because education is an international enterprise that is not limited to any particular time and place, it is therefore properly studied cross-culturally. This is not to reject the view of education as a small-scale individual process in which techniques of micro-observation, analysis of small-group behaviour, and observations of classroom interaction and culture are desirable. The two approaches should properly be regarded as complementary and, as they are developed, they should contribute to better understanding of the educational process at all levels.

In education and in the social sciences at large, approaches range from attempts to identify the regularities of human behaviour in social settings to emphasis upon the special, even unique qualities of the phenomena studied. Comparative education is no exception. At one end of the scale lies a group of works intended to test particular hypotheses systematically: quantified data are statistically analyzed and inferences and predictions are made, with conventional caveats. At the other end are studies of a different nature: colourful, intuitive,

eclectic, impressionistic, ranging widely over history, philosophy, and education, spiced with social comment. Whether a particular piece of work has value is not so much a matter of where it stands on this particular range of alternative approaches as it is of how well the work has been done in its own terms.

Comparative education studies include a valuable scholarly tradition in the more humanistically oriented direction, and in recent years the field has been enriched by a growing array of works built upon empirical social science models. Viewed as complementary modes of study, both can contribute substantially to knowledge in comparative education.

5

Fundamental Principles of Education

One word of caution must, however, be added here. While there is everything to say for the basic principle of Basic education—the correlation of intellectual subjects with the environment through the medium of a craft—we must not push the principle to absurd lengths. A pioneer in any field is apt to be carried away by his enthusiasm. There have been advocates of Basic education who claim that every subject from simple counting to thermodynamics can be, taught through the medium of a craft. Such claims are obviously exaggerated and a little reflection makes it clear that correlation has its limits. One cannot teach algebra—to take a subject the school level—through a craft except by resorting to unnatural and far-fetched devices. As for theoretical studies at a higher level—whether it is physics or metaphysics, chemistry or logic—they are still less amenable to the method of correlation. Everything is related to everything else, says Hugely, but it is surely a caricature of the Hegelian position to hold that the character of the Absolute changes every time an individual sneezes.

Unless one is careful, one can lead Basic education to equally assured lengths. The principle of correlation must extend also to the community which the school sees to serve. Since the school seeks to reflect, the life of the community, it must choose a craft in relation to the local environment. It may seem like labouring the obvious, but still it has to be stressed that if a craft without local roots is chosen, one of the main education advantages of Basic education is lost. Basic education aims at developing the children's faculties through systematic and graded performance of activities connected with some familiar craft. If the craft is not one that is familiar, it may impose an undue strain on the children's energy and interest. The craft chosen for the school must therefore be one which has a natural relation to the environment. If this is not so the

emphasis on a craft may, instead of helping to integrate the personality of the child, lead to the creation of a new hiatus. The choice of a familiar craft is important for another reason. Succeeding generations show signs of mental and spiritual distance in all countries. Novelists and dramatists have often brought out vividly the conflict between fathers and sons. The risk of distance and conflict is greater in a country where the older generations is unlettered and the younger literate.

The danger becomes still greater if the country is undergoing a process of rapid modernization. In such a situation, the children may develop an attitude of superiority to their elders. The elders on their part may develop an ambivalent attitude which on the one hand is suspicious of the new ways and on the other full of admiration for things they do not understand. They may also expect too much from literacy. The basic idea of Basic education—to build up the educative process round a familiar craft—can go a long way in obviating the danger and ensuring that the hiatus between fathers and sons does not become too great. It is necessary to consider further the question of the selection of a craft for a Basic school.

Since the education is essentially craft centred, the choice of the craft may made all the difference between success and failure. We have already pointed out that the educational significance of a craft would depend largely on the place it occupies in the life of the community. Now we have to go a step further and indicate limitations which follow from overemphasis of any one craft. Basic education seeks not only to train the future citizen but to do so under conditions which are as close to life as possible. It is therefore essential that the Basic school must reflect the life of the community. No community can survive, let alone flourish on any single craft. If therefore a Basic school is engrossed in only one craft, it would to that extent fail to reflect the many-steadiness of life. Spinning and weaving have often been regarded as the only crafts suitable for Basic schools. While the importance of spinning and weaving cannot be ignored, it has to be remembered that concentration on them to the exclusion of other crafts would violate a fundamental principle of Basic education.

LEARNING OF BASIC EDUCATION

Concentration on one craft is inconsistent with the spirit of Basic education in another way. In formal and academic teaching a prescribed syllabus is binding on the pupils as well as the teacher. Schools are more concerned with completing the syllabus before the date of the examination than with preparing future citizens of the State.

Basic education claims that learning through activity gives a wide freedom to both the teacher and the taught. This cannot however be ensured in the absence of alternative crafts. Restriction to one craft means that teachers and children with different tastes and abilities have no freedom of choice. Alternative crafts are thus necessary for three reasons. Multiple crafts tend to reflect something of many-sidedness of life. Different crafts meet the requirements of children and teachers with different abilities. Still more important the presence of alternative

crafts given to the child a sense of freedom of choice. The above discussion should make it clear that, on educational considerations alone, there is an unmistakable case for the gradual conversion of all existing elementary school into Basic schools. The educational argument is given added strength by the economic situation in India. Gandhi was attracted to the system as much by its educational value as by his feeling that its introduction may well be the only means to make education accessible to all. Our present economic backwardness cannot be denied. Any system which is expensive would therefore have to be ruled out in our present context however desirable it may otherwise be. Basic education by its emphasis on craft aims to make education at least partly self-supporting.

PATTERN OF BASIC EDUCATION

Although there are local exceptions to the pattern of basic education in the rural areas of low-income countries sketched above, opportunities for basic learning are generally inadequate to help rural dwellers to break out of the poverty cycle. This lack of basic learning opportunities is both a contributing cause and an effect of rural poverty. It is part of what the International Fund for Agricultural Development calls the 'interlocking logjam' of disadvantages. Rural people are poorer partly because they are likelier to live in remote areas, to be unhealthy and illiterate, to have higher child/adult ratios and to work in insecure and low-productivity occupations.

They may also experience discrimination as members of ethnic minorities (IFAD, 2001). These several disadvantages tend to overlap (*e.g.*, poor, illiterate, malnourished women belonging to an ethnic minority in a remote rural area) and cumulate so as to reduce their access to education and any possibilities of escaping from poverty or helping their children to escape. Basic education by itself is unlikely to break this vicious circle, but it should be a key part of a rural poverty-reduction strategy. Given the oft-reiterated commitment of governments to reducing poverty, why is there not greater investment in basic education in rural areas? The main reason seems to be that developing country governments have other priorities that absorb their attention and resources.

Public expenditure patterns reveal that most countries' real priorities favour urban development rather than rural development. This reflects an understandable concern to deal with the many problems associated with the relentless process of urbanization, but it is also a response to the growing political power of the urban population. "Where resources have to be divided between rural and urban spending on, for instance, health and education, outlay per head is normally less in reaching rural areas, even though rural people have lower initial health and literacy. So higher spending in rural areas should normally improve outcome more than higher spending in urban areas" (IFAD, 2001). Thus this urban bias in public expenditure is not only inequitable, it is not cost effective, nor does it contribute to a country's sound, overall development.

The poverty and political weakness of rural populations are cited as main causes of rural neglect in a recent report issued by UNESCO's International

Research and Training Centre for Rural Education: "... governance in developing countries bypass [sic] the politically voiceless – those who suffer multiple deprivations on account of their income, ethnicity, gender, religion and because they live in rural areas ... The poor in general and religious, ethnic and cultural minorities, in particular, bear disproportionately the burden of deprivation from essential public services including education [...]. The facts clearly are that the social sectors, especially the priority items of human development and education for the politically inarticulate and invisible rural poor, have been crowded out from government budgets by such items as heavy military expenditures, keeping afloat loss-making public enterprises in urban areas, subsidies that do not often reach the poor and external and internal debt servicing" (INRULED, 2001).

Basic education thus suffers neglect for reasons that apply to all forms of social investment in rural areas, but there are also other reasons specific to its nature.

As seen above, the vast, unmet basic learning needs in rural areas cannot be satisfied through schooling alone. Much effort and investment is needed to reach out-of-school children, adolescents and adults. Most developing countries make little provision in their education budget for such programmes, nor do they have the administrative capacity to manage them. Although the 1990 World Conference on Education for All stressed the importance of providing basic education for all children, *youth and adults*, governments (and donors) have tended to focus exclusively on universalizing primary education – an ambitious goal in itself. Consequently, the provision of basic education for youth and adults, as well as out-of-school children, has been left largely to NGO and private initiatives.

Even when government recognizes the imperative need to invest more in rural areas, it must sort through many competing demands and fix reasonable priorities. For some countries, prior disappointing experiences with agricultural education and with adult literacy campaigns raise legitimate questions about how best to proceed. For instance, how can primary school curricula be made relevant to local needs and conditions? What kind of adult basic education programmes will be most effective? Attempting to deal with these issues through a centralized education bureaucracy is fraught with problems and few governments have so far found a formula that allows sufficient flexibility and accountability.

Meanwhile, indecision and hesitant initiatives prevent any serious increase in resources allocated to basic education in rural areas. Finally, the very enormity of the needs in rural areas may have sometimes discouraged investment. According to one analysis, the generally dismal picture of education in rural areas tends to reinforce a 'deficit view' that lowers expectations, overlooks options, and reduces enthusiasm among those who could initiate and carry out improvements (World Bank, 2000a: 5). The question for them becomes: Why invest scarce resources in a less promising, if not hopeless, part of the education system? However, the next section examines a number of positive experiences that suggest that this 'deficit view' is unduly pessimistic.

VALUE BASED EDUCATION

The word for 'Education' in many Indian languages is vidya. The root vid, from which vidya is derived, represents a homology meaning, 'to know' and 'to exist' from which words like vidwan are derived nanya pantha vidyate anyanaya. Thus, the word vidya translated into English means 'To learn is to exist', 'Existence is knowledge or learning to be'. Every living organism is prewired for the capacity to learn, to remember and experience. Therefore, neither can there be life without education nor can there be education divorced from life.

Vidya becomes a-vidya when education initiates a process where wisdom is lost in knowledge and knowledge in information, where materialism divorced from spiritualism seeks pleasure and comfort which distort perception of reality and where complete lack or distorted vision of inter-connectedness leads to alienation, isolation and anomie. When this happens, one's responsibility to oneself, to one's neighbours, country and the world becomes the premium.

Melvin J. Lasky, in his book *Utopia and Revolution* points out how utopia ends in revolution, revolution turns into dogma, dogma provokes heresy which in turn triggers revolution. This cycle enslaves the minds of intellectuals in such a way that they become victims of a new cycle. In the words of Nietzsche ".....life no longer resides in the whole. The word becomes sovereign and leaps out of the page, and the page comes to life at the expense of whole, the whole is no longer a whole".

In ancient India, life was measured in terms of fullness. Since fullness is such a concept that the product of all the four mathematical operations is fullness there was no space for emptiness, isolation and alienation when Vasudhaiva Kutumbakam and Yadum ure yavarum Ke ½ir "the world is my village and every person my kinsman", how can one become lonely? When God is so pervasive that one can accept and surrender, reject and deny, or doubt and question, how can one escape God? Thus, God being a presence even in refusal and rejection, a person cannot, but be aware of interconnectedness, environmental, social and cosmic, value education must, therefore, begin with awareness of one's connection with the immediate eco-culture, with fellow beings in society and with cosmic laws and forces which bind the particular with the universal. The creative interdependence among the three has become all the more essential in face of modern science and technology, which is based on the triple principles of self destructive competition, materialistic acquisition and emphasis on commodity values.

Rabindranath Tagore made a distinction between Mukhos 'mask' and Mukhashree 'natural glow of the face'. That distinction is all the more important to remember today, when education tends to teach the use of mask rather than helping the natural inner glow to be reflected. School is not an extension of home, it has become either a substitution or rejection of home. The school does not treat the child as a resource. The child is treated as an object to be fashioned in the image of the elders by knowing textbook lessons doing social work pre-determined by curriculum makers. There is no effort at relating knowing and doing with being and becoming. That explains why modernity is not rooted in

tradition and seeking of status and affluence through grossly improper measures of excellence gets precedence over professional excellence and idealism to fight against untruth, injustice and inequality or to seek the causes of all of these.

The denial of the child and the refusal to treat the child as an independent layer of social science concern finds expression in the rejection of the child's home language in formal schooling. The teacher's lack of cognition of the processes of language acquisition and processes of reading and writing on the one hand and the teacher's belief that there is a single standard and correct form of language is responsible for this rejection. The dialects and the minority languages are also rejected on this count. Whether it is the child or the non-standard 'dialect' speaker, (s)he is not perceived as a human being, but a human becoming. With the waves of educational theories since World War II, the focus of concern has moved like a pendulum from the subject matter to the child and vice versa, but the medium has been taken for granted. That is why curricular reform has meant change in textbooks and methods of approaching them, but has seldom concerned itself with modes of language use, communicability of languages used in textbooks and linkage between home language and school language on the one hand and first, second and further language on the other.

Intellect, emotion and will are the basic faculties of human psyche and all three are integrally related to language development. By rejecting, suppressing, supplanting, or denigrating the mother tongue, not only creativity and innovativeness is curbed, but the resultant intellectual mediocrity and emotional sterility distorts the perception of life as an integrated whole. Take for example English medium education for Indian language speaking children. Lack of words in English for the familiar flowers, fruits, plants, trees, birds, beasts, rains, winds results in an imbalanced relation between the child and the environment. Neutralisation of the three dimensional kin terms by terms like uncle, aunt and cousin result in distortion in the perception of societal relations. Lack of transmission of the myths and other cultural symbols leads to the creation of cultural perception blind spots which affect appreciation of literature, plastic and performing arts and architecture which use such myths and symbols. All these lead to disintegration of society and culture. All these erodes the values the culture holds high.

Value is not mask to be worn, but is a glow permeating culture. It is manifested in the personal, societal, psychological, cultural, educational, economic and political behaviour. As the seminar on the New Education Policy and Moral Education convened by the Bharatiya Vidya Bhavan, rightly observes, "A society wallowing in luxury, conspicuous consumption, obscenity, dissipation, corruption, disparities, exploitation, rivalries, hatred and violence can never achieve any real progress howsoever vast and well planned the efforts of Government may be for its economic development." It is unfortunate that neither social scientists nor agencies engaged in the study of development have undertaken trend measurement in respect of values among the youth both in school and out of school.

Let me share with you my perception of changes in values which have taken place during my life time. When I was young, money was not the defining

criteria of success and respectability. Family tradition was a major factor. A Complex set of factors explained respectability of family and cut across castes and class. Joint family was still the norm and naturally family ties were cohesive and dense which absorbed a lot of socio-economic shock and tension. Marriage was arranged by the family, where informally the son or daughter's consent was obtained, family traditions were checked and the whole society participated in celebrations. There was a work ethic. A person who did not work was criticised. Today a person who works is criticised. We were then told that, early to bed and early to rise, keeps a man healthy, wealthy and wise. The present day youth addicted to late night TV shows or nocturnal violence wakes up late from an alcoholic slumber. For him/her to be lazy, corrupt and inefficient is to be healthy, wealthy and wise.

In my young days, a person who did not take loan was respected. Now a person who does not take loan is considered foolish and one who gets away with the loan is considered clever. There has been a movement towards "deauthoritisation" as a result of which there is lessening of obedience to authority of law, the police, the government, the principal in an educational institution and the boss in a work situation. In my young days a sense of patriotism led us to movement of disobedience to an alien authority. The present trend appears to have no respect of the traditional concept of patriotism. The uncritical acceptance of Marxian dogma that labour has no country and the capitalist dogma that capital has no country has made the Indian intellectuals rootless and abettors of ruthless exploitation. Uncritical acceptance of liberalised sex modes without reference to the individual and social values has created a class of people who are neither Indian nor Western. The present day Indian youth is taught in a dilemma. Their values are not a synthesis between what is good in traditional and in modern values, but an antithesis of traditional values. It is primarily due to ignorance of tradition and its distorted representation as seen through Western eyes. Ideologically, they are opposed to a purely economic society bound in daily routines and which has no care for others, but practically they seek security in money which leads them to support an undering society. Neither organized religion nor organized schooling has been able to present a synthesis of life which would help deal with opposites and steer a course which would make a person to be Indian as well as universal without losing many identities which link the local with the universal.

In the past Hinduism was a cover term for all those who practised their own religion, without disrespect for other religions. Thus Hinduism encompasses monism, dualism, triad, transcendentalism, immanence, worship of 23 millions of gods including nature, idea and object gods as well as those challenging the existence of god. This was not a religion in the narrow sense of the term, but Dharma which binds together apparently disparate elements. In a single thread by which one perceived one self as a part of cosmic whole. Unless the core value of respect for different is emphasized in all disciplines and in all modes of behaviour, the thirst of Western values incompatible with the India, will continue to erode the value base of the Indian society and threaten its very existence. At the time of doubt and despair, Buddha's message to his discipline, was Attadipo

bhava. This has been variously translated as “make yourself a light’ and ‘look inwards of light’, At a time when we are uncertain and afraid of our own identities and confused about the road to take, there is greater need to emphasize an integrated life and value based education. Therefore, all of us, young and old, who are victims of identity crisis, disbelief, dismay, and resultant paralysis of thought and action join together in involving the cosmic principle.

THE ECONOMICS OF BASIC EDUCATION

The products of the children’s labour have social utility and can, therefore, be absorbed in the social economy. For various reason the best utilization of such products is in the school itself. If part of the food and clothing of the teachers and the pupils can be met from the products of their labour one big item in the educational budget of the nation would automatically be met. Further, it would give both pupils and teachers an added incentive and a sense of fulfillment if they find the results of their labour coming back to them. If after meeting these requirements of pupils and teachers there is still some surplus, it could be utilized for meeting some unserviceable school expenses. The economics of Basic education has to be carefully worked out, not only to test its claim that it makes a system of national education feasible, but even more to ensure that its educational value is not impaired.

Over-emphasis on production carries with it the risk that the school may be turned into a factory exploiting child labour. The risk is made greater by the fact that Basic education makes far greater demands on the teacher than the traditional school. We have indicated how Basic education eases the burden on the pupil by bringing greater variety into school work and breaking the monotony of reading and writing by intervals of productive labour. Liberation of the pupils from a prescribed syllabus however places on the teacher the task of co-ordinating all school activities. This imposes on him a constant strain, for he has continually to find solutions to problems as they arise. The traditional teacher can fall back on a set routine but the teacher in a Basic school has no such easy way out. So long as Basic education is carried out by a body of devoted pioneers, there is not much risk in this. When, however, the system expands and the early missionaries are replaced by professional men, not all of whom can be expected to have a sense of dedication to the work, there will be a real risk that the teachers may concentrate on those aspects of Basic education where success or failure can be easily measured. Since the creative aspects of education are intangible and cannot be measured, the spread of Basic education involves a distinct risk that teachers may fall back on increase of production as the only measure of their success. To find out if a school has produced a prescribed quantum of goods is simple. It is not so easy to judge whether it was developed the character of the pupils and given them an appreciation of the values of life.

It is of course clear that in the first two or three years, the goods produced by the children can have little economic value. As the children grow up and acquire greater skill, the goods they turn out should improve in quality.

Insistence on standards is necessary as a part of education. If the children are properly trained and do their work with skill, care and conscientiousness, there is no reason why the products should be unsatisfactory or shoddy. If a thing is to be done at all it ought to be done well. There is no overture in amateurishness or lack of skill. Production of goods of good quality is therefore part of the training children must receive in schools.

It cannot however be stressed too strongly that the school is a centre for training citizens of the future and *not* a factory for turning out goods for current consumption. The craft on which education is centred should draw out the abilities of the child and make him realize the organic nature of society through its correlation with other subjects. Some of the goods produced by the child should and will be saleable, but there should be no attempt to make saleability the sole criterion of his work. It ought to be remembered that even a child of fourteen or fifteen is at best an apprentice. Any attempt to make him a skilled artisan at that age can be successful only if standards are kept low. From the point of view of the community, it is better that an adolescent should be a half-trained technician of promise than a finished craftsman of a low order.

One other consideration should be kept in mind in discussing this question. The training itself will differ according to the end in view. If the aim is to increase production, the trainer will concentrate on increasing the skill of the trainee. This can be done best by breaking up the process of production into various stages and making each trainee specialize in one particular item. If the aim is the education of the child, the teacher will, as soon as it has acquired a fair degree of skill in one, transfer it to a new item in the process of production. If a school of carpentry seeks to produce a larger number of chairs, every pupil in the school will specialize on one particular item in the production of chairs.

EXPANSION OF BASIC EDUCATION

If on the other hand the aim is to turn out good and skilled carpenters, every pupil will be made to go through every stage of carpentry. There is bound to be some loss in productive efficiency by such transfers but it would be more than compensated by the enlargement of the experience and the enrichment of the personality of the pupil. It cannot be emphasized too strongly that production in a Basic school is essentially a by-product. While any income derived from the sale or utilization of such products is welcome, it should not be expected to contribute more than a very small share towards the nation's educational budget.

The expansion of Basic education and the induction of large numbers of teachers without the missionary spirit make it necessary to devise safeguards against the conscious or unconscious exploitation of children by overzealous or pedestrian teachers. A teacher with vision and imagination can make the children do great deeds but there is a risk that the routine teacher may seek to emulate his example by forcing the children beyond their capacity. Some kind of a limit may, therefore, be set to measure the volume of work expected of children. Careful and extensive experiments are necessary before this can be done and in

any case, such limits must be flexible and vary according to the nature of the institution and the craft. Some who have considerable experience of Basic schools hold that it would be enough if the cost of the raw material utilized for crafts is recovered, but this does not seem adequate. The longest experience of Basic education is available in Bihar. Some of the schools there have recovered as much as fifty per cent. Or more of the total expense of the school, but for various reasons, it is doubtful if the experience of these pioneer institutions can be repeated elsewhere. Many Bihar schools have however earned double the amount spent on purchase of raw material for the craft and this seems a reasonable demand. On many perhaps say that at least twice the cost of the raw material used plus the depreciation of the equipment ought to be recovered from the work done by the teacher and the pupils. If this is not done, it would be a reflection on the efficiency of the teacher. Similarly, an upper limit might be fixed at about twenty to thirty per cent, of the expenses of the school. There would be a strong presumption that if this limit is exceeded, the teacher is placing greater emphasis on the productive than on the educational aspects of the craft.

The Central Advisory Board of Education has considered this problem in some detail. It has heard the views of those who stated with the claim that the school should and can be completely self-supporting, but on being pressed conceded that it would be enough if the children learnt to be self-reliant in all things. The Board after careful consideration declined to prescribe any fixed proportions of recover and contented itself by recommending that equal attention should be paid to the academic and the productive aspects of Basic education if the system is to succeed.

Over-emphasis on the productive aspect of craft is thus a danger which basic education must avoid. This does not however imply any criticism against the system as such, for there is no system in the world which cannot be abused. The provision of multiple crafts has a special importance from this point of view as well. Many crafts will mean greater diversity for both pupils and teachers and help to emphasize the educative rather than the economic aspects of Basic education.

At the same time, it would in the long run contribute to the economic betterment of the country. Multiplication of crafts is particularly needed in a country like India which suffers from widespread poverty. Basic schools with multiple crafts would create the foundation for the expansion of industry and trade. The experience of Soviet Russia in the early days justifies such a hope. The progress of universal education received a great impetus when education was built round different crafts. Children as well as adolescents were offered the prospect of improving their skill and earning capacity. This was the first step towards polytechnization of schools and polytechnization supplied the foundation on which industrialization and development of Soviet Russia has been built. The spread of Basic education may well be the beginning of such polytechnization for India.

Freedom and organization are the two principles that ensure not only the progress but the very survival of society. A spirit of freedom and of loyalty to

the organization must therefore be inculcated in the child from the beginning of his conscious life. That is why the Basic school has as one of its foremost aims the development of spontaneity and social sense in the child. Spontaneity leads to the flowering of all the faculties of the child. Social sense gives him a sense of responsibility and makes him aware of himself as a productive agent in society. The system of class ministers and executives develops initiative and the sense of repressibility. Corporate activities emphasize the value of co-operation. Together, they make education real to the children, for they feel that they are members of a community. In our prevalent types of education, the child is *told about* society and what he ought to do. In basic education, the child is made to *live as* member of the community. One is verbal instruction and therefore twice removed from life. The other is actual participation in the life of the community and therefore direct training in citizenship.

A Basic school should therefore be an example of democracy in action. Whether this idea is achieved depends largely on the quality of the teacher. Like all democracies, the school community can function effectively only if there is intelligent and adequate leadership. I have already indicated that with its freedom from textbooks and a prescribed syllabus, Basic schools make great demands upon the teacher. I have seen Basic schools where there were attempts to correlate the teaching of physics or chemistry to the craft of spinning, but the children had no idea of the area or size of the classroom, or even of their own weight and height. I have seen other Basic schools where learning was one continuous and exciting adventure of discovery of the environment by the children. In any system, it is ultimately the teacher who matters, and in the Basic school he matters even more than in the ordinary school.

Happiness is in a sense the end of all human activity. In fact some psychologists have defined happiness as the satisfactory performance of a function. The imposition of books and dead routine has caused much misery to children by enforcing prolonged periods of inactivity. Basic education seeks to remove this by offering the child an opportunity of free and spontaneous but purposive and useful activity. The introduction of crafts makes the school more vital and interesting to the child and breaks the monotony of merely academic or literary work. If, however, too great an emphasis is placed on making the schools economically self-sufficient, the craft may become for the children a wearisome burden rather than a pleasurable creative activity.

National programmes of education in almost all countries seek to make learning a joyful process. Efforts are constantly made to lessen the fatigue and monotony and to increase the interest of pupils. This healthy tendency must be encouraged by every means in India. It is the more necessary to emphasize this point in the Indian context, as we often have a tendency to exalt suffering for its own sake. Asceticism has always had a strong appeal to many Indians. Persons with a strong sense of idealism feel that to give up pleasure for the sake of their cause is the test of their sincerity. Suffering for the sake of an ideal may ennoble a person, but we must remember that suffering in itself has no value and can be justified only as a means to an end. Among some teachers in Basic schools there is a tendency to exalt suffering or austerity for its own sake. Unless such

tendencies are checked, there is a danger that Basic education, instead of being a great release of the creative urges of the younger generation, may become a check and a deterrent.

Basic education truly understood liberates the child from monotony and boredom by combining mental and physical work and making academic subjects grow out of the activities of a craft. It seeks to create an atmosphere of freedom and joy in the school. Basic education is therefore good for the child, for it helps him to develop his personality through freely chosen and self-initiated activities. What is good for the child is good for society as well. One advantage to society has already been pointed out. By meeting at least in part the expenses for a national system of universal education, Basic education helps to make education accessible to all. It also helps to overcome the objections of those who seek to judge all human activities in terms of social utility. All agree that education is productive in the long run, but the short-term difficulties often prevent the realization of the long-term gains. Judicious investment no doubt yields profit but what is one to do if there is no capital to invest. It is to this question that Basic education attempts an answer. Basic schools seek to prove that education need not be an investment yielding only indirect and distant profits, but one in which the returns can be direct and immediate.

One final word of caution is necessary before this study is concluded. From the nature of the case, the change-over from the traditional to the Basic pattern of education must be gradual. The conversion of over two hundred thousand schools and retraining of almost a million teachers must necessarily be spread over many years. Since the two systems will have to continue side by side during this transitional period, it is necessary to ensure that there is no antagonism between them. We should not therefore encourage the idea that the conversion means a violent break with the past. We should rather look upon it as a reassertion of certain old values which for various reasons had been forgotten or ignored. That young children should be trained through activity, that all school subjects should be taught in an integrated manner and that education should be purposive and self-evident truths. All good educationists have recognized these principles in practice even though they may not have always formulated them as explicit theories. Nevertheless, the conscious acceptance of these principles is of sufficient importance to make the Indian decision to convert elementary education to the Basic pattern one of evolutionary significance.

ELEMENT OF BASIC EDUCATION

Nevertheless, Basic education introduced one new element in the concept of activity as related to schools. In Basic education, the activity chosen for the training of the child is a purposive, creative and socially useful activity. When a mother engages her child in some activity, she no doubt has a purpose, but the child need not be conscious of it. Nor is the child's activity in fact always creative or useful. Similarly, the activities emphasized in the Schools of Europe and America do not take into consideration whether such activities have any social purpose or not. It is the addition of this element of social utility to the child's

activity that differentiates Basic education from other types of activity-centred education. The emphasis on social utility and purpose is not accidental or fortuitous. Production is the backbone of organized human life, for society lives by its capacity to produce the goods needed by its members. The level of production can be sustained by the co-operative effect of all. Basic education in its emphasis on socially useful activity treats the child as a member of the community from the very beginning of his educational life.

While educational thinkers in India and outside increasingly stressed the value of activity and freedom, the system prevalent in India tended to become more and more book-centred.

Even in the case of children it became more and more an exercise of the memory than a development of intellect, emotions and character. Overmuch concern with books tended to divorce education from the realities of Indian life. It often drew the child away from his social and cultural milieu and encouraged in him a distaste, if not contempt, for manual labour. The result is that the child trained up in the traditional way tends to become dependent upon a particular type of employment. If opportunity does not offer in that particular direction, he often becomes helpless and hopeless. As a result an average educated man in India often lacks self-confidence and initiative and flounders hopelessly when confronted with a new and changing situation. Apart from its failure as preparations for life, the system is not satisfactory even from a purely educational point of view.

Instead of aiming at the balanced development of personality, it tends to place an undue emphasis on the intellect. The will and imagination are neglected and, of the different aspects of the intellect, a greater emphasis is placed on memory than on reasoning and judgement. The result is that even the intellect does not attain its full maturity. The child acquires information but does not grow up into an adult human being.

Gandhi reacted against the prevailing system the prevailing system of education even though he was himself its product. His revolt started from its educational inadequacy but gained in strength because of the economic and social implications of the alternative he had helped to evolve. It would, therefore, be well to point first to some important aspects in which Basic education marks a departure from the form of education which has been prevalent in India in recent times.

One fundamental defect of the traditional system is that instead of basing secondary and higher education on a well-planned and comprehensive system of elementary education, it has made secondary and primary education subsidiary and subservient to higher education. In a sense this was perhaps inevitable. It is only in the last hundred years or so that the State has recognized that the provision of a system of universal education is one of its obligations.

If this was so with national Governments, one could hardly expect an alien Government to provide such facilities for its subjects. The East India Company and later the British Crown were interested in introducing western education primarily for utilitarian ends. It was a means of training a sufficient number of Indians in English to make the task of administering the country easier. It is true

that a band of Christian missionaries and enlightened Indian leaders had different aims. There also were in the Government itself men like Macaulay who held that contact with western sciences and political thought would benefit the Indian people. The main emphasis on education however remained utilitarian. In consequence elementary and secondary education were regarded mainly as stages preparing the pupils needed at the higher stage. It was also inevitable that in such a context the needs of the rural areas, where the vast majority of the Indian people live, should be largely ignored. Basic education is seeking to remedy the situation in both respects. It places a far greater emphasis on rural needs and seeks to serve as a completed stage of education for the average citizen.

Another defect from which the system which the British introduced suffered was that it was essentially an individualistic system. For a century or more, it emphasized the theme of competition rather than co-operation between individuals and societies.

PREVALENT SYSTEM OF BASIC EDUCATION

This was not surprising, for like the educational philosophy which guided Britain during the nineteenth century, it was based on a misunderstanding of the theory of evolution. Though co-operation is at least as important for survival as competition there was a tendency to interpret evolution in terms of the struggle for existence among individuals and groups. The educational system of the day reflected this tendency and encouraged in the individual a desire to get on without regard to the general interest. Adherents of this philosophy believed that the general interest would be somehow served if each individual pursued his own ends. Basic education also differs from the prevalent system in its emphasis on the performance of concrete tasks and the joy which is its accompaniment.

Traditional education, particularly in the hands of unsatisfactory teachers, tends to reduce all instruction to an intellectual drill. Because of its abstract nature the contents are often unintelligible and therefore uninteresting to the pupils. They do not understand what they are taught and fall back on mechanical memorizing.

Information remains so much dead matter and does not become part of the texture of living thought. Since the child does not see the purpose of the education he receives, he remains passive and in many cases, an unwilling subject who submits to, rather than receives, education. As opposed to this, in education centred round a craft, a child has immediate experience of the results of his labour.

The product of the craft is to him a physical symbol of success and gives him a sense of achievement. Artists and scientists know that there is no greater pleasure in life than which follows the successful accomplishment of a self-imposed task. Though in a lower key, children in Basic schools have a sense of similar exhilaration when they see the product of their own labour.

By its emphasis on manual work, Basic education is helping to break down another barrier which has long divided Indian society. In origin, the caste system may be traced to the need for the division of labour. It is also true that at one

stage it was functional and had a large degree of flexibility. This was however soon lost and the ossification of caste led to a sharp division between intellectual and manual labour. In course of time, manual labour acquired an element of social stigma.

The impact of the British did not help to break down this repugnance to manual about. The class consciousness of the British was added to the caste consciousness of the Indians and created a situation where the gap between defloration social state become even more right than before. Simultaneously, economic and political conditions were creating a situation where such inequality could not last. Nevertheless, the pressing attached to the so-called intellectual classes persisted. It was inevitable that in such a context, the system of education prevailing in India should become essentially bookish and literary.

By its close correlation of instruction with manual labour and physical activities, Basic education is helping to break down the repugnance to manual work and inculcating in the minds of children a recognition of the dignity of labour. The concentration of socially useful work has yielded good dividends in other respects as well.

The children are engaged in crafts which lead to the production of material goods. The result of their labour is thus seen by them almost immediately. By giving them the satisfaction of tangible achievement, it serves to increase their self-confidence. It is common knowledge that confidence leads to enhancement of ability. Besides, the performance of tasks in co-operation with their fellow develops in the children a sense of social responsibility.

Responsibility brings with it a sense of discipline, not imposed from above but evolved in the pursuit of their work. That children in Basic schools often display greater self-confidence and sense of discipline than children in ordinary schools is, therefore, not accidental. So far as innate qualities go, there is no reason why there should be any difference between children in the two types of schools. They all come from the same community with more or less the same social background. The only difference is in the atmosphere of the school and the method of teaching. In one case, the children are subject to discipline imposed from above. In the other, they are given freedom of activity within the limits prescribed by the schools. The fact that children in the traditional schools are all the time recipients and not contributors to society, while children in the Basic school are producers and conscious of the fact, can alone to explain the difference in their deportment.

Of the various criticisms levelled against the traditional system, one of the most valid is that school subjects are chosen at random and often have no intelligible relation to one another. Thus a child may study history and mechanics and a classical language without any idea even on the part of the teacher as to why these particular subjects have been chosen. Basic education seeks to correct this effect by establishing an organic correlation between the different school subjects by drawing out their implications in relation to a selected craft.

6

Modern Theories of Intelligence

Early intelligence theory emerged from an emphasis on a unitary concept of general ability, as can be seen in the definitions of Binet and Spearman. Spearman created a statistical technique called factor analysis to explore his approach. From his studies with this technique, he was able to report that about half of the variance in tests of mental ability was due to the general (*g*) factor. The remainder was due to the special ability (*e.g.*, numerical reasoning, vocabulary, mechanical skill) that was required of a person to enable performance of the specific tasks on the test. Later approaches tended to emphasize expanded abilities. For example, Cattell divided *g* into fluid (*gf*) and crystallized (*gc*) intelligence. *Fluid intelligence* encompasses abilities involved in thinking, reasoning, and in learning, while *crystallized intelligence* represents the knowledge and broader understanding that has developed through learning in the environmental setting.

Other theories further recognized the diversity of intelligent performance. In his 1967 book *Joy Paul Guilford (1897–1987)*, using factor analysis, devised a model of intelligence he termed the *Structure of Intellect* in which he proposed three aspects of intelligence: operations, products, and contents. Each of these is broken down further into specific kinds of intellectual activity which Guilford considered interrelated to produce intelligent functioning of specific tasks.

Gardner (1993) proposed a theory of multiple intelligences based on the differential cognitive processing required for demonstration of intelligent or creative performance in different areas. Gardner's theory references eight intelligences. Linguistic and logico-mathematical intelligences are most often associated with academic performance, although others could be relevant depending on the task. Other intelligences identified by Gardner were musical, kinesthetic, spatial, naturalistic, and personal (intrapersonal and interpersonal).

Robert Sternberg also proposed a theory informed by research from cognitive psychology. Sternberg's model is named the *triarchic theory* of intelligence because it is composed of three kinds of components: memory-analytic, creative-synthetic, and practical-contextual. The first component is related to the academic view of intelligence and is most similar to what most intelligence tests measure. The second component is necessary for creative endeavors, including traditionally academic areas such as science and mathematics. Finally, the practical-contextual is necessary for success in an everyday environment like school or business. Daniel Golman (1995) has proposed an emotional intelligence that bears some similarity to the personal intelligences of Gardner and the practical intelligence of Sternberg, but goes further in tying emotion and personality to the capacity for intelligent behaviour. For example, fear, excitement, or anger may contribute to how one behaves regardless of one's knowledge or capacity to reason.

In the first half of the 20th century, research in intelligence was heavily influenced by factor analysis (first used by Spearman). Factor analysis is a statistical procedure that enables the systematic study of the relationships within a set of variables in order to find the common aspects. Research and theory emerging in the second half of the 20th into the 21st century has begun to have an impact on the methods of assessment of intelligence. For example, research in cognitive psychology, neuro-psychology, cognitive science, biopsychology and evolutionary processes, and cultural psychology has begun to affect theory and research in intelligence, its measurement and applications.

MEASUREMENT OF INTELLIGENCE IN EDUCATIONAL SETTINGS

Two kinds of intelligence tests will be presented here. The first, group tests, are used to identify the range of IQ scores in a group, usually for research or administrative purposes. Group tests tend to have more specific content and question formats, and are designed for more specific purposes than individually administered tests, which aim for a relatively more comprehensive clinical picture of the individual's cognitive functioning. The individual tests are designed to provide much more information about the individual. They are only used by professionals who are trained and licensed to administer and interpret these assessment instruments as part of a comprehensive clinical assessment that contributes information useful for planning educational or therapeutic interventions. These tests provide a variety of scores and clinical information that licensed professional psychologists may use to plan interventions in schools, family, or other settings. In other words, the usefulness of individual intelligence tests goes well beyond the scores on the test. For this reason, group tests are not suitable substitutes for individual assessments when planning clinical or educational interventions.

Group Tests of Intelligence. Two examples of group intelligence test. The Cognitive Abilities Test, and the Multidimensional Aptitude Battery, Second Edition (MAB-II) were chosen because they may be used in school or educational settings.

The Multidimensional Aptitude Battery-II (MAB-II) is a multiple-choice assessment of aptitude and intelligence that can be administered to groups or individuals above the age of 16. The instrument was designed to obtain scores similar to that of the individually administered Wechsler Adult Intelligence Scale-Revised (WAIS-R) in a group, as opposed to individual administration. The MAB-II produces composite scores: Verbal Scale (Information, Comprehension, Arithmetic, Similarities, Vocabulary), Performance Scale (Digit Symbol, Picture Completion, Spatial, Picture Arrangement, and Object Assembly) and Full Scale. The test can be pencil and paper or computer-administered.

The MAB-II is considered to be a useful tool for assessing cognitive abilities when large numbers of students must be screened. It is a well-developed and empirically sound instrument that provides correlations between subtest scores and occupational strengths. The test can be administered by a proctor, rather than by a post-master's-level professional. As a result, the MAB-II should not be used for making clinical diagnoses about intelligence. Additionally, MAB-II should not be administered to students with a learning disability related to reading comprehension or whose reading level is below ninth grade because the test relies on the test-takers' reading ability.

The Cognitive Abilities Test—Multilevel Edition, Form 6 (CogAT-6) is one of the more widely used group ability tests for students in kindergarten through 12th grades. The test is intended to guide instruction to match the cognitive abilities and needs of each student, to provide an “alternative” measure of cognitive development, and to identify achievement-ability discrepancies. The test has a multitheoretical foundation as it is based on Vernon's model of hierarchical abilities, Cattell's model of crystallized and fluid abilities, and Carroll's work specifically on general abstract reasoning. The CogAT-6 is composed of two editions: the Primary and Multilevel Editions, both of which are intended to assess reasoning and problem-solving abilities and can be broken down into Verbal, Non-verbal, and Quantitative Batteries. The Primary Edition is designed for students in K–2nd grade and consists of six subtests. The Multilevel Edition is a nine-subtest instrument that is based on the Lorge-Thorndike Intelligence Tests and is appropriate for students in 3rd to 12th grade. The CogAT-6 has a mean of 100 and standard deviation of 16.

DiPerna's 2005 review of the CogAT-6 suggested that the strengths of the test include a large, representative standardization sample, co-norming with the Iowa Tests, and a theoretical basis. In spite of these positive attributes, significant weaknesses were cited relative to the CogAT's purposes as described earlier. Criticisms included insufficient empirical evidence to support basing instructional recommendations on test results, a lack of reliability and predictive validity to measure cognitive ability and to predict cognitive ability-achievement discrepancies.

Individual Intelligence Tests. The following individual intelligence tests will be reviewed:

- Wechsler Intelligence Scale for Children-IV (WISC-IV)
- Woodcock-Johnson Tests of Cognitive Abilities-III (WJ COG III)
- Stanford-Binet Intelligence Scales, Fifth Edition (SB5)

- Das-Naglieri Cognitive Assessment System (CAS)
- Kaufman Assessment Battery for Children (K-ABC)

The Wechsler scales continue to be the most widely utilized individually administered tests of intelligence. The Wechsler tests are based on the *g* factor or the “overall capacity of the individual to act purposefully, to think rationally, and to deal effectively with the environment”. The Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV) is the current revision of the Wechsler scales for children 6.0 to 16.11 years of age. The WISC-IV comprises 15 subtests (5 of which are supplemental).

Scores on these tasks contribute to the four composite indices (Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed) in addition to a Full Scale IQ (FSIQ) score that can range from 40 (very low) to 160 (very high), with a mean of 100 representing the average score, and a standard deviation of 15. A profile of the test taker’s learning strengths and weaknesses are derived from the test performance. The FSIQ is derived from a combination of all subtest scores and is considered the most representative estimate of global intellectual functioning. However, when large discrepancies between Index scores exist, the FSIQ can be invalid and misleading. In this case, it is most helpful to describe the strengths and weaknesses in the profile and de-emphasize the FSIQ.

The WISC-IV continues to be a reliable and valid instrument. WISC-IV scores can be interpreted in combination with Wechsler Individual Achievement Test, Second Edition (WIAT-II) scores for comparisons between ability and achievement. Flanagan and Kaufman (2004) provide an extensive description of the strengths and limitations of this assessment tool.

They cite the WISC-IV’s most significant strengths as being “a robust four-factor structure across the age range of the test, increased developmental appropriateness, de-emphasis on time, improved psychometric properties, and an exemplary standardization sample.” Flanagan and Kaufman (2004) indicate that none of the WISC-IV’s limitations are very serious, although they suggest ways in which its validity could be improved. Other Wechsler scales have been developed to assess IQ for young children and adults. The Wechsler Preschool and Primary Scale of Intelligence, Third Edition (WPPSI-III) (Harcourt Assessment, 2002) can be administered to children 2.6–7.3 years old and the Wechsler and the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III) (Harcourt Assessment, 1997) is given to adults between 16 and 89 years of age.

The Woodcock-Johnson Tests of Cognitive Abilities-III (WJ COG III) is also widely used instrument in school settings. The WJ COG III is often administered as the examiner’s second choice, if the age-appropriate Wechsler scale has been administered less than three years from the current assessment date. The WJ COG III is based on Catell, Horn, and Carroll’s (CHC) concept of intelligence. The WJ COG III has been normed on individuals age 2 through 90+. The standard battery includes 10 tests, while the extended battery consists of 20. Based on these scores, the examinee earns three Cluster Scores (Verbal Ability, Thinking Ability, and Cognitive Efficiency) and a General Intellectual Ability (GIA) score. Test scores in the standard and extended batteries are not

weighted equally when the GIA score is computed. The WJ COG III has high technical quality and is based on a well-respected theory of cognitive abilities. It assesses cognitive abilities for a wide age range and uses sophisticated scoring procedures to calculate scores and discrepancies (Sattler, 2001). Additionally, ability and achievement discrepancy norms are provided as the WJ COG III was co-normed with the Woodcock Johnson Tests of Achievement, Third Edition (WJ ACH III). Greater evidence is necessary to understand the utility of the clinical clusters. The WJ COG III may also overestimate abilities if interpreted incorrectly. For example, the Written Language test score emphasizes one's ability to write brief sentences rather than to develop and organize paragraphs.

The Stanford-Binet Intelligence Scales, Fifth Edition (SB5), a direct descendent of Terman's adaptation of the Binet test developed more than 100 years ago, is used occasionally in the educational setting. The SB5 is based on the CHC theory of intelligence. It is designed for assessing intelligence and cognitive abilities among individuals between the ages of 2 and 85+. The SB5 consists of ten subtests and these scores are used to calculate four composite scores: factor, domain, abbreviated, and full scale (score range 40–160, mean = 100, SD = 15). The five factors measured include Fluid Reasoning, Knowledge, Quantitative Reasoning, Visual-Spatial Reasoning, and Working Memory, each with verbal and Non-verbal components. The SB5 contains two domain scales: Non-verbal IQ (NVIQ) and Verbal IQ (VIQ). An Abbreviated Battery IQ (ABIQ) can be determined with two routing subtest scores and the Full Scale IQ (FSIQ) is calculated using all 10 subtests.

The SB5 is advantageous as it emphasizes both verbal and Non-verbal abilities. The instrument is technically sound, according to Johnson and D'Amato (2005), although Kush's 2005 study cites technical limitations (*e.g.*, lower stability for young children and individuals with low cognitive abilities, problematically high correlations with achievement, uncertain factor structure). In spite of these weaknesses, the SB5 is referred to as an outstanding measurement instrument for the assessment of cognitive abilities of children, adolescents, and adults.

The Das-Naglieri Cognitive Abilities System (CAS) is a tool based on Luria's cognitive processing model that is intermittently used to evaluate cognitive abilities in schools. The CAS is useful for assessing Planning, Attention, Simultaneous, and Successive (PASS) abilities among students between the ages of 5.0 and 17.11. The instrument's basic battery comprises 8 subtests and the standard battery consists of 12 subtests.

The CAS is an innovative instrument and its development meets high standards of technical adequacy. When compared to other individually administered general ability tests, it takes less time to administer. Additional empirical research must be completed to support the PASS construct. Factor analyses of subtests support both a 4-factor PASS model as well as a 3-factor model, which suggests that Planning and Attention may or may not be separate factors. The Kaufman Assessment Battery for Children, Second Edition (KABC-II) is occasionally utilized in schools as a culture-fair assessment of cognitive abilities for students between the ages of 3 and 18.

The KABC-II is based on a dual theoretical framework, Luria's neuropsychological model and the CHC approach. The authors suggest that its multitheoretical base allows the examiner to select which model is most appropriate for interpretation of results depending on the culture and/or verbal skills of the examinee. This assessment instrument contains 20 subtests that contribute to 4 scale scores (Sequential Processing, Simultaneous Processing, Planning, Learning, and Knowledge). The KABC-II has a mean of 100 and standard deviation of 15.

The KABC-II is an acceptable option for measuring cognitive abilities as it provides a reasonable, well-normed, clinically appealing, and technically sound approach to measuring cognitive abilities and generating diagnoses. Other strengths of the KABC-II include smaller score discrepancies between ethnic groups and the ability to compare ability and achievement differences with the Kaufman Test of Educational Achievement, Second Edition, Comprehensive Form. However, it has been criticized for the suggestion that examiners can select the model (Luria or CHC) by which to interpret results. Braden (2005) and Thorndike (2005) suggest that the interchangeability of theoretical models is inappropriate and illogical.

Intelligence testing should not be conducted in a vacuum. In addition to using previously mentioned norm-referenced tests, an assessment should include a variety of other data from a multitude of informants.

Sattler (2001) suggests that norm-referenced testing should be accompanied by interviews with a parent, teacher, and student; observations of the student during both the formal testing and natural environment (*e.g.*, classroom, lunchroom, playground); and informal assessment procedures (*e.g.*, district-wide criterion-referenced tests, school records). Such an assessment will provide the most accurate information by which educators can most effectively serve the student. Group versus Individual Intelligence Tests. Whereas group-administered IQ tests can be very well constructed (Aiken 2003) and can provide valid and reliable information suitable for certain non-clinical applications, they do not provide the same kind of information as individual tests and should not be used for the same purposes.

One reason is that group tests primarily emphasize multiple-choice question format, whereas individually administered tests provide a variety of response formats across the test.

This allows clinicians to gather considerable clinically useful information about the person being tested, such as the approaches used in problem solving, quality of verbal expression, and other observational data.

Group tests were not designed to be used for clinical purposes and therefore should not be utilized in clinical settings or to substitute for individually administered intelligence tests for designing clinical interventions or individual educational programmes (IEPs) in school settings.

Individual intelligence tests are designed to be administered by highly trained professionals who interpret data through the lens of learning, cognition, emotion, language, culture, health, and development. The one-on-one setting provides advantages to the test-taker and the examiner. First, it allows the examiner to develop rapport with the test-taker, which can benefit the shy or anxious test-

taker. Second, the examiner has the opportunity to observe important test-taking behaviour such as impulsiveness, compulsiveness, confidence, anxiety, and wandering attention, which may vary according to the task and contribute to the interpretation of the performance on the test.

Third, the examiner can observe specific problem-solving approaches, which may also vary with the task. The integration of these observations with test scores allows the examiner to take a holistic approach in interpreting scores and developing interventions.

FIELD OF LEARNING IN EDUCATIONAL PSYCHOLOGY

There are interesting moves within the field of ‘learning’ that offer possibilities beyond the focus on individual learners. Learning has become the biggest area in educational psychology, since it encompasses many paradigms. Approaches to research in learning have been described as a move from the ‘behaviourist/empiricist’ to the ‘cognitive/rationalist’, with the recent addition of an approach more timely for the critical project, the ‘situative/pragmatist-sociohistoric’ perspective.

Research on metacognition, which refers to reflection on or strategic use of cognition, emerged later in the cognitive/rationalist era. When I began to question my ‘training’ as a cognitive psychologist, metacognition was a breath of fresh air in the highly technical world of cognition. Instead of the view that some children were just born with bright or dull minds, metacognitive work opened up the new possibility that some students had more sophisticated strategies, techniques and management skills for organising and using their knowledge than other students. This has led to an entire field of work with children who have ‘learning problems’ (perhaps better called ‘teaching problems’, to change the emphasis from the deficit of an individual learner). Such students have been found to benefit from specific instruction or reflection on particular learning strategies and techniques.

Much recent work within a developmental framework has also moved away from the Piagetian focus of earlier decades towards a now more fashionable Vygotskian purview. Vygotsky differed from western developmental theorists in his attention to the social and cultural milieu in which all people, including the newborn, are immersed. Neo-Vygotskian work which takes the emphasis on collective, community understandings of information is Moll and Greenberg’s (1990) study of the transmission of knowledge in a Latin American community in Arizona. A literacy project began in a bilingual Spanish/English classroom, and unfolded into an exchange of information between school staff, researchers, and extended family members throughout the community. Students and their families began to set the agenda for the learning they wanted to document, using the languages of the community.

A more recent shift in learning studies, that of situative knowledge, offers further possibilities for considering learning as milieu, rather than as an internal change in a body. The situative approach has been described as viewing

‘knowledge as distributed among people and their environments, including the objects, artefacts, tools, books, and the communities of which they are a part’. An interesting example of situative knowledge is found in work on ‘distributed cognitions’ among groups of students and teachers.

In work also influenced by Vygotsky, Ann Brown and colleagues considered ways that groups of students share information in working together on tasks in human biology, tracking this through on-line conversations with the tutor and amongst students. A wider field of research on cooperative learning also centres on the functioning of learning outcomes for a group rather than dividing the learning by individuals. This approach has exciting possibilities for moving away from a focus on the individual student as responsible for particular actions, based on his/her capacities. There is more scope for considering learning as a group outcome, in which bodies and other objects play their part. Though much of this work centres on the specific bodies, technologies and curriculum content of a particular learning setting, this could be broadened to consider a wider milieu framed by historically-shaped language and cultural practice.

7

Foundational Role of Educational Psychology in Teaching

The teacher's tasks are: motivating students, managing the classroom, assessing prior knowledge, communicating ideas effectively, taking into account the characteristics of the learners, assessing learning outcomes, and reviewing information-must be attended to at all levels of education, in or out of schools.

Can good teaching be taught? The answer is definitely yes. Good teaching has to be observed and practiced, but there are principles of good teaching that teachers need to know, which can then be applied in the classroom.

The major components of effective instruction are:

- Knowledge of subject and teaching resources
- Critical thinking and problem-solving skills
- Knowledge of students and their learning
- Teaching and communication skills

One attribute seems to be characteristic of outstanding teachers: intentionality. Intentionality means doing things for a reason, on purpose. Intentional teachers are those who are constantly thinking about the outcomes they want for their students and about how each decision they make moves children Towards those outcomes. Intentional teachers know that maximum learning does not happen by chance. Yes, children do learn in unplanned ways all the time, and many will learn from even the most chaotic lesson. But to really challenge students, to get their best efforts, to help them make conceptual leaps and organize and retain new knowledge, teachers need to be purposeful, thoughtful, and flexible, without ever losing sight of their goals for every child. In a word, they need to be intentional.

Intentional teachers are constantly asking themselves what goals they and their students are trying to accomplish; whether each portion of their lesson is appropriate to students' background knowledge, skills, and needs; whether each activity or assignment is clearly related to a valued outcome; whether each instructional minute is used wisely and well. An intentional teacher trying to build students' synonym skills during follow-up time might have them work in pairs to master a set of synonyms in preparation for individual quizzes.

Research finds that one of the most powerful predictors of a teacher's impact on students is the belief that what he or she does makes a difference. This belief, called teacher efficacy, is at the heart of what it means to be an intentional teacher. Teachers who believe that success in school is almost entirely due to children's inborn intelligence, home environment, or other factors that teachers cannot influence, are unlikely to teach in the same way as those who believe that their own efforts are the key to children's learning. An intentional teacher, one who has a strong belief in his or her efficacy, is more likely to put forth consistent effort, to persist in the face of obstacles, and to keep trying relentlessly until every student succeeds.

An intentional teacher achieves a sense of efficacy by constantly assessing the results of his or her instruction, constantly trying new strategies if their initial instruction didn't work, and constantly seeking ideas from colleagues, books, magazines, workshops, and other sources to enrich and solidify their teaching skills.

The goal of research in educational psychology is to carefully examine obvious as well as less than obvious questions, using objective methods to test ideas about the factors that contribute to learning. The products of this research are principles, laws, and theories. A principle explains the relationship between factors, such as the effects of alternative grading systems on student motivation. Laws are simply principles that have been thoroughly tested and found to apply in a wide variety of situations. A theory is a set of related principles and laws that explains a broad aspect of learning, behaviour, or another area of interest. Without theories the facts and principles that are discovered would be like disorganized specks on a canvas.

Theories tie together these facts and principles to give us the big picture. However, different theorists may interpret the same facts and principles in different ways. As in any science, progress in educational psychology is slow and uneven. A single study is rarely a breakthrough, but over time evidence accumulates on a subject and allows theorists to refine and extend their theories.

It is probably true that the most important things teachers learn, they learn on the job-in internships, while student teaching, or during their first years in the classroom. However, teachers make hundreds of decisions every day and each decision has a theory behind it, whether or not the teacher is aware of it. The quality, accuracy, and usefulness of those theories are what ultimately determine the teacher's success.

Developmental research indicates that as students enter adolescence, the peer group becomes all-important to them, and they try to establish their independence from adult control, often by flouting or ignoring rules. Basic

research on behavioral learning theories shows that when a behaviour is repeated many times, some reward must be encouraging the behaviour, and that if the behaviour is to be eliminated, the reward must first be identified and removed. Teachers can use this information to plan effective teaching strategies and avoid being sidetracked by class management issues.

Research in educational psychology not only provides evidence for principles of effective practice, but it also provides evidence about the effectiveness of particular programmes or practices. For example, in the vignette at the beginning of this chapter, Leah Washington was using a specific approach to creative writing instruction that has been extensively evaluated as a whole. In other words, there is evidence that, on average, children whose teachers are using such methods learn to write better than those whose teachers use more traditional approaches.

There is evidence on the effectiveness of dozens of widely used programmes, from methods in particular subjects to strategies for reforming entire schools. An intentional teacher should be aware of research on programmes for his or her subject and grade level, and should seek out professional development opportunities to learn methods known to make a difference for children.

Many researchers and educators have bemoaned the limited impact of research in educational psychology on teachers' practices. Indeed, research in education has nowhere near as great an impact on practice as research in medicine or agriculture or engineering. Yet research in education does have a profound indirect impact on educational practice, even if teachers are not aware of it. It affects educational policies, professional development programmes, and teaching materials. It is important for educators to become intelligent consumers of research, not to take every finding or every expert's pronouncement as truth from Mount Olympus.

How do we know what we know in educational psychology? As in any scientific field, knowledge comes from many sources. Sometimes researchers study schools, teachers, or students as they are, and sometimes they create special programmes, or treatments, and study their effects on one or more variables (anything that can have more than one value, such as age, sex, achievement level, or attitudes). There is no one best or most useful approach to research; any method can be useful when applied to the right set of questions. The principal methods educational researchers use to learn about schools, teachers, students, and instruction are experiments, correlational studies, and descriptive research.

In an experiment, researchers can create special treatments and analyze their effects. In one classic study, Lepper, Greene, and Nisbett (1973) set up an experimental situation in which children used felt-tipped markers to draw pictures. Children in the experimental group (the group that receives a treatment) were given a prize (a "good player award") for drawing pictures. Children in a control group received no prizes. At the end of the experiment, all students were allowed to choose among various activities, including drawing with felt-tipped markers. The children who had received the prizes chose to continue drawing with felt-tipped markers about half as frequently as did those who had not received prizes. This result was interpreted as showing that rewarding

individuals for doing a task they already liked could reduce their interest in doing the task when they were no longer rewarded. The Lepper study illustrates several important aspects of experiments. First, the children were randomly assigned to receive prizes or not. For example, the children's names might have been put on slips of paper that were dropped into a hat and then drawn at random for assignment to a "prize" or "no-prize" group. Random assignment ensured that the two groups were essentially equivalent before the experiment began. This equivalence is critical, because if we were not sure that the two groups were equal before the experiment, we would not be able to tell whether it was the prizes that made the difference in their subsequent behaviour.

A second feature of the above study that is characteristic of experiments is that everything other than the treatment itself (the prizes) was kept the same for the prize, and no-prize groups. The children played in the same rooms with the same materials and with the same adults present. The researcher who gave the prize spent the same amount of time watching the no-prize children draw. Only the prize itself was different for the two groups. The goal was to be sure that it was the treatment, not some other factor, which explained the difference between the two groups.

The Lepper study is an example of a laboratory experiment. Even though the experiment took place in a school building, the researchers created a highly artificial, structured setting that existed for a very brief period of time. The advantage of laboratory experiments is that they permit researchers to exert a very high degree of control over all the factors involved in the study. Such studies are high in internal validity, which is to say that we can confidently attribute any differences they find to the treatments themselves (rather than to other factors).

The primary limitation of laboratory experiments is that they are typically so artificial and so brief that their results may have little relevance to real-life situations. For example, the Lepper study, which was later repeated several times, was used to support a theory that rewards can diminish individuals' interest in an activity when the rewards are withdrawn. This theory served as the basis for attacks on the use of classroom rewards, such as grades and stars. However, later research in real classrooms using real rewards has generally failed to find such effects. This finding does not discredit the Lepper and colleagues study; it does show that theories based on artificial laboratory experiments cannot be assumed to apply to all situations in real life but must be tested in the real settings.

The randomized field experiment, in which instructional programmes or other practical treatments are evaluated over relatively long periods in realistic conditions, is often used in educational research. Randomized field experiments are very difficult to do in education, as it is rare that teachers are willing to be assigned by chance to one group or another. For this reason, field experiments more often use matching, in which teachers or schools using one method would be matched with those using a different method, or a control group. Matching is much more practical than random assignment, but its results must be carefully interpreted, since there may be reasons that one group of educators took on one

method while another group did not. In single-case experiments, a single student's behaviour may be observed for several days. Then a special programme is begun, and the student's behaviour under the new programme is observed. Finally, the new programme is withdrawn. If the student's behaviour improves under the special programme but the improvement disappears when the programme is withdrawn, the implication is that the programme has affected the student's behaviour. Sometimes the "single case" can be several students, or a whole class.

Perhaps the most frequently used research method in education is the correlational study. In contrast to an experiment, in which the researcher deliberately changes one variable to see how this change will affect the other variables, in correlational research the researcher studies variables as they are to see whether they are related. Variables can be positively correlated, negatively correlated, or uncorrelated. An example of a positive correlation is the relationship between reading achievement and mathematics achievement. In general, someone better than average in reading will also be better than average in math. When one variable is high, the other tends also to be high. An example of a negative correlation is days absent and grades. The more days a student is absent, the lower his or her grades will tend to be.

The principal disadvantage of correlational methods is that while they may tell us that two variables are related, they do not tell us what causes what. Indeed, correlation does not imply causation-this is a frequent pitfall for novice researchers.

Experimental and correlational research looks for relationships between variables. However, some research in educational psychology simply seeks to describe something of interest. One type of descriptive research is a survey or interview. Another, called ethnography, involves observation of a social setting (such as a classroom or school) over an extended period. Descriptive research usually does not have the scientific objectivity of correlational or experimental research, but it makes up for this lack in richness of detail and interpretation.

Developmental psychologists use descriptive research extensively to identify characteristics of children at different ages. The Swiss psychologist Jean Piaget, who began by carefully observing his own children, did the most important research in developmental psychology. As a result of his observations, he developed a theory that describes the cognitive development of children from infancy through adolescence.

Action research is a particular form of descriptive research that is carried out by educators in their own classrooms or schools. In action research, a teacher or principal might try out a new teaching method or school organization strategy, collect information about how it worked, and communicate this information to others.

Because the people involved in the experiment are the educators themselves, action research lacks the objectivity sought in other forms of research, but it can provide deeper insight from front-line teachers or administrators than would be possible in research done by outsiders.

To teach in the public school system, it is necessary to obtain a license or certificate. The state requirements vary but all states require graduation from a four-year college

with some specialized classes in teacher preparation. Although requirements are sometimes similar, there are many unique requirements also, especially in the area of licensure tests and alternative certification requirements. Continuing professional development is one of the basic requirements considered to be an ongoing one. Experience teachers find that teaching is a professional service that requires continuous updating. In this updating and sharing of information among their colleagues and/or the educational professional community, teachers become “educational researchers” as they critically examine their own practice, testing, and various strategies to help students learn.

EDUCATIONAL PSYCHOLOGY

Nothing can be said to be *Taught* until it is *Learnt*. Students in a classroom vary in their ability to learn. Devising appropriate teaching—learning strategies remains one of the chief responsibilities of psychologists. Towards this end they have formulated a number of learning theories suited to the nature of the learning tasks and the nature of the learners. The Creator has been rather unfair in his dispensation.

Some are *Gifted* while some are *Mentally Retarded*. A vast majority, of course, fall midway between two extremes. Teaching techniques need *Adaptation* to the mental ability-level of students. Psychologists render a great deal of assistance in this regard.

Children in Nursery School need entirely different atmosphere of freedom, activity and scope for manipulative work. Play-way method would appeal to them to learn almost all subjects. Psychologists would help in this regard.

Psychology helps us in understanding the process of remembering and various methods of learning that would ensure retention. They also study the phenomenon of forgetting and several ways of arresting the loss of memory.

Educational psychology deals with the issue of *Assessment* of learning, improved methods of *Framing Questions* and *Evaluating* pupil-performance. It helps us to compare one’s *Achievement* with one’s *Potential Ability* so as to identify *Underachievers*, who would need help to improve their scholastic performance.

Educational psychology studies the development of *Personality* and the roles played by *Family*, *Play Groups*, *School* and *Community* in this regard. *Assessment* of personality also is one of the concerns of Educational Psychology.

In addition to the study of intelligence, Educational Psychology is also concerned with the promotion of *Creativity* among pupils. It helps us to understand the subtle differences between Intelligence and Creativity.

Lastly Educational Psychology deals with the problem of *Maladjustment*. The role of *Guidance* and *Counselling* in helping not only the maladjusted child but normal children too in cultivating good study-habits, selecting subjects appropriate to their abilities and aptitudes and also preparing for a *Vocation* are highlighted in this field.

In short, Educational Psychology is interested in studying all aspects of life from *Infancy* to *Adulthood* so as to help pupils lead a meaningful life.

ACTION RESEARCH

Research in Exact Sciences and Social Sciences: Everyone is familiar with the term *Research*. Progress in any field of human enterprise is closely linked with Research and the constant feedback it provides. Normally we tend to associate Research with Sciences and more so with exact sciences like Physics, Chemistry and Biology. We would need a laboratory to conduct Research. The data obtained by means of Research are analysed by Statistical methods to ensure Validity and Reliability. Objectivity is, of course, the hallmark of every Research. What has been conducted in one laboratory in one country could also be *Replicated* in another setting to verify the uniformity and generalisation of inference. Strictly speaking the term 'Research' could be extended to any worthwhile endeavour by an investigator to define and analyse a problem, gather data, process, generalise, infer and arrive at a conclusion. The investigator attempts to be unbiased, objective and systematic all through the study. While it is relatively easier to be exact in measurement, observation and generalisation in exact sciences it is not all that easy in *Social Sciences*. Psychology is one such discipline in which one segment is amenable for exact measurement and another segment for approximation.

However, within a century of its existence, Psychology has made rapid strides in Research and Experimentation to claim its rightful place in the comity of Sciences. Educational Psychology is one of the applied fields wherein systematic research has yielded valuable data regarding Learning, Motivation, Intelligence, Personality, Creativity and so on. Teacher education is one field wherein there is ample scope for experimentation and modification of traditional practices. The proof of advancement is the publication of several journals on Education in recent times.

KINDS OF RESEARCH

BASIC AND APPLIED RESEARCH

Research could be classified under various heads. We have *Fundamental* or *Basic* research and we have *Applied* research. Basic research is aimed at investigation of a problem with the sole objective of formulating a theory. It contributes to advancement and refinement of a branch of science. While it is not the primary concern of Basic Sciences to examine the applicability of research findings it does result in improved practices. As a matter of fact, basic research is the backbone of advancement of any kind. It has long-term goals. Applied research, on the other hand, is primarily devoted to finding a solution for a problem within a time-frame. It is not the concern of applied science to formulate a theory. It is more concerned with practice. Almost all industries promote applied research as this deals with contemporary issues. The National Laboratories in our country promote Basic research. The gestation period of formulating a theory and its eventual percolation into practice is pretty long. One should not on that score, freeze funds for Basic research. It would be suicidal for the advancement of Science.

SURVEY RESEARCH

Research could be of a *Survey* type wherein an investigator would prepare a *Questionnaire* and administer the same on a *Representative Sample* of the *Population*, collect data, analyse and draw inferences. Care is bestowed all through so that the endeavour is free from flaws. Social issues figure in this regard. Assessment of Moral Education, Physical Education, Competition, Medium of Instruction, Sex education could be investigated by eliciting the views of parents, teachers and students. Many Ph.D students prepare their dissertations on the basis of systematic surveys.

HISTORICAL RESEARCH

Here the investigator makes use of the records, journals and books available in a library to make an indepth of study of a problem such as “The influence of British rule upon Indian Education” or “The genesis of Basic Education” or “The Origin of Caste System” or “Promotion of Art during the Mughal Period” or “The aftermath of partition in Independent India” and so on.

It is an attempt to reconstruct history, a re-examination of the past with a view to arrive at a new interpretation. It is mostly retrospective though the researcher might find vestiges of the colonial rule in contemporary society. It serves a specific purpose, namely the glimpses of historical events that have influenced Education from time to time.

EXPERIMENTAL RESEARCH

Experimentation is controlled Observation. It involves precise statement of the problem, analysis of the variables involved by using measurement devices and arriving at a generalisation. We have discussed this at length in the first Chapter under ‘Experimental Method’. More value is attached to this kind of research because this activity enhances the validity, reliability and objectivity of our study. This method bridges the gap that exists between Exact Sciences and Social Sciences.

By using appropriate statistical techniques the investigator is able to reduce the errors of observation and generalisation. It is more creative and challenging. Unlike the large sample required in Survey Research, we need an adequate small sample but stricter control of conditions. Doctoral study based on Experimental Research needs not only time but expert guidance as well from learned Professors. It is rewarding and enriching to the researcher as well as the guide.

PRESENT SCENARIO OF TEACHER EDUCATION

In a society that is undergoing a great deal of transformation consequent upon the abandonment of antiquated knowledge and skill, Teacher-training institutions cannot just perform the role of preparing teachers of the traditional type. Except for a smattering of Educational Psychology, Philosophy, School

administration and Methods of Teaching a trainee hardly gains functional knowledge, flexible teaching strategy and innovative teaching in most Training Colleges. A trained teacher is in no way superior to an untrained, raw graduate in terms of practising innovative methods of teaching. Since the Department of Education in every State stipulates Teacher Training as an essential pre-requisite there is a gate-crashing rush in all Teacher-training Colleges to seek entry and complete the course rather ritualistically. The sole motive of the vast majority of teachers is mainly to tag on a B.Ed. degree rather than acquiring a new insight into teaching.

It would not be an exaggeration to say that under these circumstances, Teacher-training degenerates into a kind of ritual, devoid of any excitement. In view of the changes in high-school curriculum initiated by the National Council of Educational Research and Training (NCERT) and the Central Board of Secondary Education (CBSE), one has to take a second look at the Teacher-preparation level.

STEPHEN COREY AND ACTION-RESEARCH

In the early Seventies an American Educationist by name *Stephen M. Corey* visited India and disseminated the concept of *Action-Research*. Action-research represents the implementation of *John Dewey's* idea of harnessing class-room teaching in solving particular problems. Stephen Corey attempted to integrate Research and Classroom teaching. Usually researches are confined to Post-graduate Department of Education in Universities and seldom percolate to the level of high-school teachers. Being fully aware of the limitations of an average teacher in understanding sophisticated Research-methodology, he introduced a new system called *Action-Research*.

Many of the problems facing a teacher require immediate attention. He cannot look for remedy or solution in Research journals because these may not be easily accessible or he might lack the necessary knowledge in interpreting the findings. Such on-the-spot research aimed at the solution of an immediate problem is known as *Action-Research*.

CONVENTIONAL RESEARCH AND ACTION-RESEARCH

How does an Action-research differ from Conventional research? Usually, the term 'Research' connotes a rigorous study of a clearly defined problem under carefully controlled conditions on a representative sample of the population with due care bestowed upon Research-design and statistical analysis of data.

The findings of a Research-study extend far beyond the confines of the sample and help the investigator to arrive at broad generalisations. A good deal of time, resources and expertise are needed to carry out such a research-project.

An action-research, on the other hand, is less rigorous and more adapted to the immediate needs of a class-room teacher. Quite often a teacher gets dissatisfied with his own teaching techniques and wants to do better. A teacher habituated to a stereotyped way of doing things cannot improve. Constant revision and modification are indispensable.

WHAT IS A TEACHING PROBLEM?

When the teaching aims are not achieved a problematic situation arises. It is the disparity or gap between the teacher's intention, his aspiration, his teaching aims and the knowledge or skills or attitudes actually demonstrated by the pupils that creates the teaching problem. The following steps are involved in Action-research:

- (i) Defining the problem
- (ii) Analysing the problem
- (iii) Hypothesising
- (iv) Designing a test of hypothesis
- (v) Obtaining evidence
- (vi) Generalising.

ADVANTAGES OF ACTION-RESEARCH

- (1) The pure researcher is unable to communicate with the practitioner. He prides himself on being a scientist and considers not having to deal with the practical situation a matter of virtue. The practitioner finds it difficult to translate the outcomes of pure research derived under conditions of strict control into an actual classroom programme.
- (2) Any change in teaching practice must be preceded by a corresponding change in the thinking and attitudes of the teacher. Such a change is more likely to take place as a result of research which the teacher helped plan conduct and evaluate than it is as a result of research reported in some journal. The teachers have a feeling of accomplishment at having tackled these problems constructively. It may lead to a higher level of research-consciousness.
- (3) Discussions connected with the planning stages of Action-research lead to insight into the nature of educational problems and research techniques to stimulate them to read related professional literature.

LIMITATIONS OF ACTION-RESEARCH

- (1) Since Action-research is almost completely empirical and local in nature, its contributions to the development of education are likely to be secondary.
- (2) Teachers, in general, are not researchers, and they are likely to experience a number of difficulties in obtaining meaningful results. The difficulties may arise from failure to define the problem clearly, resulting in the gathering of voluminous data without the guidance of a hypothesis; inability to control extraneous factors, inadequacies in the treatment of data; misapplication of the results and so on.
- (3) Fundamental research starts by defining a population and then takes a representative sample to serve as the basis for inferences concerning the population. In contrast, Action-research starts with a sample the nature of which is not identified but simply taken as it is. There is an apparent assumption that the teacher's present class is sufficiently

representative of his future classes. This is always risky since in Action-research the problem is ill-defined, the procedures used are left unclear, the subjects unidentified and so on.

These criticisms should not discourage a teacher from taking up Action-research. An Action-researcher does not attempt to imitate a research worker. He is aware of his limitations. At the same time, he has an insatiable urge to improve upon his techniques of teaching. However crude his procedures are, if he feels intuitively that he has conducted a successful experiment in Education and if he has reasonable evidence of improvement in terms of pupil-achievement he is likely to adopt more innovative methods of teaching. Such teachers would transform the dull and monotonous atmosphere of the classroom into a kind of exciting exploration. Teacher-training institutions must prepare trainees for this task.

RELEVANCE OF EDUCATIONAL PSYCHOLOGY FOR SECONDARY TEACHERS

Educational psychology has contributed considerably to the creation of the modern system of education.

The knowledge of educational psychology helps the teacher in the following ways:

- *To understand the Stages of Development:* Psychology has clearly shown that human life passes through different stages of development before it reaches adulthood. They are infancy, childhood, adolescence and adulthood. Psychologists have also thoroughly studied the characteristic behaviour patterns in these different periods of life. Identification of these periods with different sets of characteristics and attributes as regards physical, mental and emotional development greatly help educationists to design curriculum and determine appropriate methods of teaching for students at different stages.
- *To Know the Learner:* The child or the learner is the key factor in the teaching-learning process. Educational psychology helps the teacher to know his interests, attitudes, aptitudes and the other acquired or innate capacities and abilities; to know the stage of development linked with his social, emotional, intellectual, physical and aesthetic needs; to know his level of aspiration, his conscious and unconscious behaviour; his motivational and group behaviour; his conflicts, desires and other aspects of his mental health. So that perfect guidance and help can be provided and positive attitude towards the learner can be formed.
- *To Understand the Nature of Classroom Learning:* Educational Psychology helps the teacher to adapt and adjust his teaching according to the level of the learners. A teacher is teaching in a class but a large number of students do not understand the subject-matter which is being taught. To deal with the students effectively in the class the teacher must have the knowledge of the various approaches to the learning process, principles, laws and factors affecting it then only he/she can apply remedial measures in the learning situation.

- *To Understand the Individual Differences:* No two persons are exactly alike. Pupils differ in their level of intelligence, aptitudes, likes and dislikes and in other propensities and potentialities. There are gifted, backward, physically and mentally challenged children. Thus, psychology tells the teacher about the individual differences among the students in the class and the procedure, methodology and techniques to be adopted for them.
- *To Solve Classroom Problems:* There are innumerable problems like truancy, bullying, peer pressure, ethnic tensions, cheating in tests, *etc.* Educational Psychology helps to equip the teacher by studying the characteristics of the problem children, the dynamics of the group, behavioural characteristics and adjustments.
- *To develop Necessary Skills and Interest in Teaching:* Educational psychology helps the teacher to acquire and develop necessary qualities and skills to deal with the problems created by the pupils, maintain a healthy atmosphere in the classroom and show concern regarding the progress of the child.
- *To Understand Effective Methods of Teaching:* Educational Psychology has discovered several new approaches, principles, methods and techniques of teaching which are very helpful in today's teaching-learning process. Educational psychology tells us how significant play and recreation are for the children and how play-way methods turn learning into an interesting task.
- *To Understand the Influence of Heredity and Environment on the Child:* Educational psychology helps the teacher to know that the child is the product of heredity and environment. They are the two sides of a coin. Both play a prominent part in the all-round development of the child. While the child is born with a number of hereditary qualities, environment helps them to be modified according to the requirements of the society.
- *To Understand the Mental Health of the Child:* Educational Psychology helps the teacher to know what are the factors responsible for the mental ill-health and maladjustment of a student and to suggest improvement thereof. Besides this, it also provides the teacher with necessary insight to improve his own mental status to cope up with the situation.
- *To Understand the Procedure of Curriculum Construction:* Curriculum is an integral part of the teaching-learning process. Curriculum should be child-centred and fulfil the motives and psychological needs of the individual because child capacities differ from stage to stage. Educational psychology helps the teacher to suggest ways and means to curriculum framers to prepare sound and balanced curriculum for the children.
- *To Provide Guidance and Counselling:* Today guidance to a child at every stage of life is needed because psychological abilities, interests and learning styles differ from person to person. Similarly, what courses of study the child should undertake in future is also a vital question. All these can be answered well if the teacher knows the psychology of children.

- *To Understand Principles of Evaluation and Assessment:* Evaluation is an integral part of the teaching-learning process. How to test the potentialities of the child depends upon the evaluation techniques. The development of the different types of psychological tests for the evaluation of the individual is a distinct contribution of educational psychology.
- *To inculcate Positive and Creative Discipline:* The slogan of the traditional teachers was “spare the rod and spoil the child.” Flogging the child was the chief instrument. Educational Psychology has replaced the repressive system with the preventive system. Now teachers adopt a cooperative and scientific approach to modify the behaviour of the students. Emphasis is laid on self-discipline through creative and constructive activities.
- *Educational Psychology and Research:* Educational psychologists conduct research to improve the behaviour of human beings in the educational situation. For this purpose it helps in developing tools and devices to measure the performance and suggest remedial measures thereof.
- *To Know Himself/Herself:* Educational Psychology helps the teacher to know about himself/herself. His/her own behaviour pattern, personality characteristics, likes and dislikes, motivation, anxiety, conflicts, adjustment, etc. All this knowledge helps him in growing as a successful teacher.
- *Educational Psychology Helps in Professional Growth, Changing Attitude and Innovative Thinking:* Inside the classroom, educational psychology has enabled the teacher to achieve proper conditioning of pupils by achieving and directing classroom programmes on human lives. Not only this, educational psychologists are busy in finding out innovations in the field of education. These innovations will bring about professional growth of the teacher.

THE PRACTICAL VALUE OF PSYCHOLOGY TO THE TEACHER

It would be an interesting task to trace the history of psychology from its earliest crude and haphazard beginnings to its present state of advancement with its wide range of enquiries and interests, its struggles to attain exact scientific results, its efforts to employ experimental methods, its laboratories, its failures, its achievements. I have not to speak, however, of what psychology has been or is, but assuming that to be sufficiently familiar to you, I must attempt briefly to point out some of its applications to the great and noble art of teaching.

We may consider the importance of psychology to the teacher in (1) the discovery of the inter-relations of different lines of study, (2) in organizing and systematizing his own mental life, (3) in guiding the process of bringing together the subject of study and the subject who studies, *i.e.*, in helping the teacher as (a), director; (b), student; (c), educator.

THE TEACHER AS DIRECTOR

The teacher must know something about the inter-relations of different studies. He has to arrange the time-table, and frequently to teach several of the subjects. Even where, he is restricted to the teaching of some specialty he should know how his special subject is related to the others pursued by the pupils he is teaching. Does psychology occupy such a place as to make it specially valuable in seeing the inter-relations of various studies? Let us examine. Wundt divides studies into three great classes, (*a*), the natural sciences; (*b*), the mental sciences; (*c*), the philosophical enquiries. He claims that psychology is complementary to (*a*), the natural sciences, assisting in the treatment of problems otherwise inadequately solved; is the foundation of (*b*), the mental sciences, as dealing with the simple data and underlying principles of all mental sciences, and lastly it is the natural preparation for and introduction to (*c*), the philosophical enquiries.

That psychology is complementary to the natural sciences may be illustrated by a number of commonplace and well-known instances as the case of the "personal equation" in astronomy, where it becomes necessary to account for the apperception and reaction times of the observer, who is using the transit instrument to prevent mistakes. Familiar examples illustrate that the abstracted, mathematical and physical properties of the observed phenomenon do not alone explain the appearances, *e.g.*, the larger apparent size of the moon when near the horizon; the apparent motion of the sun. Other simple illustrations might be taken from the optical illusions arising when what is termed "pencils" of lines are drawn from a point between two parallel lines, cutting the parallel lines in various directions, make the parallel lines seem to curve outward; while lines drawn from points outside the parallel lines and terminating in an imaginary line midway between the parallel lines, make the parallel lines appear to curve inward, *etc.*

Cases of colour contrast afford other illustrations. A continuous strip of gray on contiguous surfaces of black and white appear darker on the white and lighter on the black background; the same gray placed on backgrounds of red and of green appear greenish on the red and reddish on the green background.

The British Scientific Association places psychology among the natural sciences in its meetings by making it a sub-section of physiology. The American Scientific Association places it under the second group of mental sciences by making it a subsection of anthropology. It belongs to both places.

Only a slight examination is required to see that for the mental sciences psychology is just as fundamental and underlying as mathematics is for the natural sciences. Note any recent advance in these and you will find it resting on insight into and appreciation some psychological principle. Look at the new methods of teaching grammar, not *before*, but *through* the language to which it belongs. Look at the complete revolution in method in the manner of teaching and using *rules*, once first, now last in the process, once announced and memorized, now discovered and constructed by the pupil himself.

Look at the improvement in history in such works as Green's Short History of the English People; going beneath the events to the life of the people, their

aims and passions, and the analysis of the character and motives of the chief actors. Look at the improvement in political economy by the introduction of psychological and ethical considerations. What may we expect in law when some of the time spent on procedure in criminal law is applied to the study of the *criminal* himself?

As to the value of psychology as an introduction to the philosophical enquiries, an objection might be raised that all of them, philosophy, æsthetics and theology, claiming to deal with the true, the beautiful and the good as ideals, are ultimately based on metaphysics, and the less we have to do with metaphysics the better.

Modern philosophy, however, should not be confound with the much-misunderstood and much-maligned mediæval disputations any more than modern chemistry with alchemy, or modern biology and medical science with the views of Theophrastus Bombastus Paracelsus. And even the superseded past should be remembered with some gratitude and respect as the progenitor of the present. "Honour thy father and thy mother." Those who cry out most loudly against metaphysics, past or present, are in almost every case the unconscious victims of the shallowest and most erroneous forms of metaphysical speculation.

It is philosophical speculation carefully conducted which has done most to expose false principles and to amend crude and erroneous standpoints. If we mean by philosophy, reflection on the meaning of experience, reconsideration of the significance of the results gained in scientific investigations, then, instead of saying no one should have anything to do with philosophy, we should rather say everyone should have something to do with philosophy.

Everyone who reflects on the meaning of life and its experiences, who desires to pass beyond the mere appearances and discover their worth and importance for life, conduct and destiny is to that extent a philosopher.

It is necessary to specialize in science to gain results. But every scientist in every field has not only the privilege but also the duty to give more than mere details connected with his specialty. He should endeavor to give hints concerning their ultimate meaning as this is revealed to him. At any rate, the teacher cannot be a mere pedant. He must be a man as well as a scholar, and he will give a respectful hearing to such investigations and cultivate an intelligent interest in them. For this, psychology is a useful introduction and preparation. May we not conclude that psychology stands in such a central position and in such intimate connection with every branch of enquiry that it is peculiarly fitted to assist in their co-ordination ?

THE TEACHER AS STUDENT

It is scarcely necessary to say anything about the importance of continual study to the teacher. He must keep alive his interest in what he is teaching by continually enriching his mind by new enquiries and acquisitions.

Our studies should be organized. Each new discovery should be made to throw light upon everything we already know.

By reflectively, actively organizing in this way the mind gains strength and insight, keeps alive its old interests and creates new ones.

Thus study is made delightful and fruitful, thought is trained to become consecutive and successful. The teacher should himself be a thinker of this type and he should have psychological insight to enable him to guide his pupils to attain such an intellectual culture.

THE TEACHER AS EDUCATOR

What the teacher acquires and gains in his own self-culture is, as teacher, a means; the end sought by him is the training of pupils. He must stimulate and awaken interest. He desires to make the subject of study a means to transform the whole character of the subject who studies. In order to accomplish this, the teacher must keep in mind the logical order of a correct presentation of the subject of study; the stage of development and powers of his pupil and the laws of his mental growth; that he may gain the result, the developed pupil. In order of presentation, he must proceed from the simpler to the more complex; and the simpler is not the most abstract but the most concrete, for he must also proceed from the known to the less known. He must arrange the presentation so that a puzzle or problem is proposed and suggested to the pupil, add his curiosity aroused to endeavor to solve it.

The teacher must sympathetically place himself at the pupil's standpoint, if he desires the pupil, to advance to his point of view. In order to do this, he should endeavor to recall the stages and processes whereby he as pupil proceeded, when he was at the stage now occupied by his pupil. The ability to do this, probably accounts for the fact that, in many cases an English-speaking teacher will be more successful in teaching pupils the rudiments of a foreign language than a native. It may also account for the fact that so large a proportion of young and inexperienced teachers succeed as well as they do.

The most important service of psychology to the teacher, is that it that it leads him to consciously and systematically study his pupils and thus awakens or intensifies his interest in them. Surely, if a doctor becomes interested in the discovery of new diseases and new remedies for them, a teacher should be interested in each new pupil and in each experiment for his improvement.

An individualized interest makes a teacher as careful of his pupils as a fond mother is of her children. He is on the alert to see that the physical well-being of the child is not neglected. Has the child had habits of sitting, or studying, or walking, or breathing? He discovers the cause and endeavors to correct kindly, wisely, and at once. Proper physical habits conduce to health and morality.

Is the child untidy or unmannerly? The teacher leads him by example and considerate advice. The child is respected and is taught to respect himself. Is the child dull and stupid? The teacher endeavors to find out if ill-health, or poor food, or ill-usage at home, is the cause; he encourages the child to play, and soon it will turn out that the teacher is found visiting the home and endeavoring to arouse parental solicitude and gain parental co-operation. This teacher will not neglect lighting, heating, or ventilation; he will be careful not to unduly fatigue his pupils, and will be found supervising their plays without officious interference. He will even be found guarding the out-houses and walls from the desecration of perverted vandalism. He will be the guide, counsellor

and confidential friend of the adolescent pupils; guarding them with solicitude and watchfulness in this critical period of unstable equilibrium, when the nature is plastic and responsive to the promptings of the highest ideals; and when, on the other hand, the danger is so great of the beginnings of perverted habits and criminal tendencies arising, if the pupils are neglected, and allowed simply to “grow up” like Topsy or Ruth Bonnython.

Let us now recall some examples of assistance from psychology, in arrangement of time table and presentation of the subject of study.

The thoughtful teacher will distinguish between the more severely logical and mathematical subjects, and the historical and literary. For the former, more concentrated attention is required, and therefore, these should be placed in the early part of the programme. When it comes to reviewing, it will turn out that the second class of studies requires more repetition and reviewing. Pupils should, however, be taught to recall directly what they have previously read and studied, without using the book to assist them. The memory should be trained in self-reliance. Perhaps it is in connection with memory that most people would think of the assistance of psychology to the student.

Kant says memory may be mechanical, ingenious, or judicious. I think it must be confessed that the earliest attempts to apply psychology in assisting and directing memory training, were chiefly of the “ingenious” kind. Discovering curious and arbitrary connections in accordance with the law of the association of ideas, through similarity, contrast and contiguity.

Many text-books seem to be constructed with the view of employing the “mechanical” memory. It is supposed that the briefer the summary, the easier it will be to learn and remember. The student is supposed to con[sic] over the tables and learn them by sheer repetition.

A deeper insight will indicate more “judicious” methods. The great rule for memory is “take care of knowing and recollecting will take care of itself.” Let the subject be taught and studied logically, systematically, thoroughly, and woven as widely as possible into the warp and woof of the mental interests and thoughts of the pupil. In this way the time spent in one subject is not taken from all others, but is contributing to all others. It is a popular fallacy to suppose that all the time spent in one subject is subtracted away from every other.

The trained and experienced teacher educates all the powers of his pupils, and utilizes every subject for this purpose. He keeps clearly before his view the result to be attained, carefully selects the most efficient means, and with solicitude and interest observes and directs the process. He desires the full and harmonious development of *all* the powers and capabilities of the pupil, physical, mental, social, moral and religious. He is aware that he is co-operating with the pupil in the formation of character. Is there anything of higher value? This thought makes the teacher reverent, it impresses him with a sense of his responsibility; it also enables him to respect his profession and see in it one of the noblest efforts of human endeavor. Although our Public Schools are sometimes accused of giving merely intellectual drill, no teacher worthy of the name is limiting his efforts to this. He is bending every energy to attain discipline and training of character, by means of the intellectual and the disciplinary; he

strives to inculcate ideals and form habits of faithfulness, honesty, uprightness, industry, truthfulness, obedience, reverence/Mark, he is not teaching *definitions* of these, that would be a “merely intellectual drill.” He is moulding the character to these moral habits. It is just because the Public Schools are so efficient that Sunday School and home continually desire to relegate more and more to the Public Schools. The careful and reverent study of the child is destined to react upon home, Sunday School and Church. If child-nature had been studied should we find the text “Except ye become as little children ye cannot enter the Kingdom of Heaven,” so continually misinterpreted to mean that there should be passive admission of truth without questioning or enquiry? Is that the way the child learns or acts? Should not our religious life exhibit the same fearless confidence in asking questions and the same readiness in putting into practice the answers that the active child displays?

It would be a wide field to follow the pernicious effects of un-psychological methods of parents and teachers in the suppressing of questions, and stifling the religious cravings of children. We have too often “offended these little ones.”

Sooner or later truer psychological methods, as exemplified in the Kindergarten, will permeate the whole school system and overflow into the Sunday School, the Church and the home. Let me add to the teacher interested in the study of psychology and its applications to his profession:— Remember that the Science of Psychology, with all its intrinsic importance and immediate usefulness, is simply the portal and propaedeutic to the higher reflective problems of the ultimate significance of life, and, art, moral conduct, and religious aspiration. As in your teaching you desire the intellectual to be the means to lift up the pupil to higher ground, prepare him for the reception of the highest truths, so let these lofty themes be in your own life constant topics of interest, perennial sources of new insight, continual fountains of noblest inspiration.

8

Integration of Emerging Communication and Information Technologies in Education

New communications and information technologies have created a global revolution in communications, access to information, and media delivery. These new communications and information technologies are facilitating the sexual exploitation of women and girls locally, nationally and transnationally. The sexual exploitation of women and children is a global human rights crisis that is being escalated by the use of new technologies.

Using new technologies, sexual predators and pimps stalk women and children. New technical innovations facilitate the sexual exploitation of women and children because they enable people to easily buy, sell and exchange millions of images and videos of sexual exploitation of women and children.

These technologies enable sexual predators to harm or exploit women and children efficiently and, anonymously. The affordability and access to global communications technologies allow users to carry out these activities in the privacy of their home.

The increase of types of media, media formats, and applications diversifies the means by which sexual predators can reach their victims. This stage will not attempt to categorise all the types and uses of this new technology. However, this stage will describe the most common and newest of these technologies, and how they are used for the sexual exploitation of women and children.

NEW AND OLD TECHNOLOGIES COMBINED

Older technologies, like television and cable are now combined with modern technologies to create new ways of delivering information, news, and entertainment. Web TV combines the television with the Internet.

New cable networks use satellite transmission to deliver hundreds of channels and pay-per-view delivers content on demand. Presently, there is a high demand for pornographic videos, through mainstream communication networks such as cable TV. Only one of eight major cable companies in the United States does not offer pornographic movies. Satellite and cable companies say that the more sexually explicit the content the greater the demand. ADULT VIDEO NEWS reports that pornography offerings on TV by satellite or cable are increasing video store sales and rentals, not decreasing them, as might be expected. The explanation is that pornography on TV is advertising pornography and finding new buyers.

The mainstreaming of pornography is increasing the exploitation or abuse of women and children used in making pornography.

Owner of ADULT VIDEO NEWS, anything sells:

- There are so many outlets that even if you spend just \$15,000 and two days – and put in some plot and good-looking people and decent sex – you can get satellite and cable sales. There are so many companies, and they rarely go out of business. You have to be really stupid or greedy to fail.

Another producer said:

- [A]nyone with a video camera can be a director – there are countless bottom feeders selling nasty loops on used tape. Whatever the quality or origin of a product, it can at the very least be exhibited on one of the 70,000 adult pay Web sites, about a quarter of which are owned by a few privately held companies that slice and dice the same content under different brands.

As a result of the huge market on the web for pornography and the competition among sites, the pornographic images have become rougher, more violent, and degrading. One producer claimed that there were “no coerced” performances in pornography videos, although she immediately acknowledged that “there are little pipsqueaks who get their disgusting little videos out there.”

The “misogynistic porn” this producer refers to involves degrading images, such as ejaculation on the woman’s face, real pain, and violence against women that results in physical and emotional injuries. In the last ten years, some American and European pornography producers have moved to places such as Budapest, Hungary because of the availability of cheap actors from Eastern and Central Europe. Budapest is a destination and transit city for women trafficked from Ukraine, Moldova, Russia Romania, and Yugoslavia.

There are hundreds of pornographic films and videos produced each year in Budapest. Budapest is now the biggest center for pornography production in Europe, eclipsing rivals such as Amsterdam and Copenhagen. Most Western European producers of sex videos use Eastern European actors whenever

possible. An executive at Germany's Silwa production company explained: "They cost less and do more. Even excruciating or humiliating acts usually cost only two or three hundred dollars."

The postal service, traditionally the most anonymous and popular way to transmit pornography, is still used by collectors and producers of child pornography to distribute the pornography. Now, sending materials through the mail is combined with internet technology. Raymond Smith, U.S., Postal Inspection Service, who handles hundreds of cases of child pornography, has found that the rise in internet use by sexual predators has also increased their use of the U.S., mail. He said that from the time they first started investigating child pornography in the early 1980s until five years ago, they have almost eliminated the distribution of child pornography. But since the internet became publicly available, the number of cases connected to the internet has steadily increased. In 1998, 32 percent of cases were related to internet.

In 1999, 47 percent were internet related, and in 2000, 77 percent of the child pornography cases were internet related. Producers of child pornography advertise their videos on the internet and distribute them through the mail. Men in chat rooms trade small files, still images and short movie clips on the internet, but longer movies are sent by mail. Stalkers talk to children in chat rooms, ask them to take pictures of themselves, and send them through the mail. When stalkers convince children to travel to meet them, they send them bus and plane tickets through the mail. Scanners and video digitisers are used to turn old pornographic images, films, and videos into electronic formats that can be uploaded the internet.

About half of the child pornography online is old images from films and magazines produced in the 1960s and the 70s. Digital cameras and recorders enable the creation of images that do not need professional processing, thereby eliminating the risk of detection. These new types of equipment also make it technically easier for people to become producers of pornography. Digital media formats are not static nor independent.

One format can be quickly converted into another. Videos are still the primary production medium for child pornography, and the still images for the Internet are produced from video captured images. From one video, 200–300 still images can be captured, and then uploaded to a newsgroup or to a web site.

Production of child pornography still combines older methods of production, while using new internet technologies for distribution:

- It is safe to say that the number of manufactures has increased over the years with the availability of new medium. Home development of black and white 35MM film, self-developing Polaroid film, video cameras, camcorders, computer scanners, CUseme technology and now computer cameras have made child pornography easier and easier to produce and reproduce.

One police analyst noted that prior to the internet the majority of collectors of child pornography were not distributors because duplication technology was not readily available. Now, making copies of image files "involves a few clicks of any computer mouse allowing for effortless distribution." Therefore, collectors of child pornography have quickly and easily become distributors.

COMMUNICATION: THE CONCEPT

The word 'communication' is derived from Latin word, 'communis' meaning commonness of experiences. However, communication cannot be defined through a single definition. Different people perceive it in different ways in different contexts. Communication has been described as "the transfer of conveying of meaning", "transmission of stimuli," 'one mind affecting another'; 'the mechanism through which human relations exist and develop, or sharing of experience on the basis of commonness". Communication involves interchange of meaning among individuals. This occurs mainly through verbal and non-verbal symbols, such as language, gestures - a shrug of the shoulders, a nod, facial expressions and actions. Same cultural context makes communication easier because words essentially represent what members of a society decide it would stand for. The knowledge of these symbols, signs and meanings is essential for effective communication. For example, let us take a simple word like 'chair'. To some, it may be a thing to sit on, however, in certain other contexts, it can denote a desired position. Thus we realise that pattern system of communication are influenced by sociocultural-political and economic contexts. Depending on the environment or surroundings in which communication takes place, it can be defined as a process of sharing or exchange of ideas, information, knowledge attitudes or feeling among two or more persons to elicit the desired/intended response.

Elements of Communication

Communication is a dynamic process involving active interaction between sender and receiver and variety of inputs. Effective use of communication in a classroom situation between teacher-pupil or pupil-pupil can accelerate the pace of actions.

Following are the elements of communication:

The Source

Source is the communicator. S/he encodes the purpose in the form of a message, to pass it on to receiver and also decides the medium-channel to use for communication.

The Message

Message may be an idea, information or attitude. It can be purposive or non-purposive. Messages drafted for achieving the specific behavioural objective are purposive. Messages with no intention to influence the behaviour are formed as non-purposive. For effective communication, the messages should be short, precise and in simple language. Clarity of message and style of presentation can enhance the effect of communication.

The Channel

The channel for communication is a medium, a carrier of information from the source to receiver and *vice-versa*. This may be verbal, non-verbal, written, printed, visual, *etc.* TV, Radio, newspaper, *etc.*, are used as means for mass communication.

The Receiver

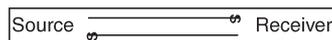
The receiver is recipient of the message. In the case of mass media, the readers, viewers and listeners are the receivers. In a classroom situation, the teacher is the source, the message is the instruction/lesson and pupils are the receivers.

The Feedback

Receiver's response to communicator's message and *vice-versa* is termed as the Feedback. Feedback is quick in face-to-face communication. This may be verbal or non-verbal. Receiver's feedback to the communicator becomes a stimulus for him/her. This provides an opportunity to gauge the effectiveness of communication and helps in improving the quality of further communication when needed.

Process of Communication

Communication is a necessary condition for growth and transmission of cultures, the continuity of societies and the effective functioning and control of social groups. The process of communication involves interaction between the communicating individuals. In education communication the response (feedback) evoked in the receiver (learner) becomes a stimulus for the communicator (teacher) to which s/he responds. Thus, in face-to-face communication, the source (teacher) and receiver (teacher-student) are at once both response and stimuli. This process continues between the players (source and receiver) in conversation game in which a number of intervening variables such as individual differences, levels of perception, motivation level, *etc.*, are involved.



Another important feature of communication is that the recipient (teacher) infers from the behaviour of communicator (pupils), what idea or feeling the other person is trying to convey. S/he then reacts not to the behaviour but to the inferred idea or feeling. The other person then reacts to his/her response in terms of his/her inference of the idea/feeling and the meaning behind it.

Communication accomplishes its purpose accurately if the message is interpreted in the same way by the communicator and by the recipient of the communication. Communication depends on the comprehension and communication skills of the individuals.

NEED OF INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION

In philosophy, ontology specifies the most fundamental categories of existence, the elementary substances or structures out of which the world is made. Ontology thus analyzes the most general and abstract concepts or distinctions that underlie

every more specific description of any phenomenon in the world, e.g. time, space, matter, process, cause and effect, system. (Heylighen, 1995). It is sometimes confused with epistemology, which is about knowledge and knowing.

In a certain context the term ontology can be confusing. For example, in information technology, ontology can also be seen as a specification of a conceptualization in the context of artificial intelligence and knowledge sharing. This means that an ontology is a description (like a formal specification of a programme) of the concepts and relationships that can exist for an agent or a community of agents. This definition is consistent with the usage of ontology as set-of-concept-definitions, but more general. (Gruber 1993)

From the paradigmatic point of view, an ontological definition of the research object is one fundamental aspect which differentiates sciences and branches of sciences. The idea of understanding fundamentally different ontologies in natural science, psychological science and social science was first suggested by Karl Popper (Popper, 1974). According to this tripartition, reality consists of three 'worlds'. World 1, which comprises physical matter, World 2, which comprises the subjective experiences and World 3, which comprises the social facts.

The worlds of Popper were considered different from each other. Modern theory of social systems is based on the idea that the social systems, psychic systems and organic systems are qualitatively different systems, but meaningful experience always consist of them all. In this sense, from our experience point of view, they are more like dimensions of experience than separate from each other. The three systems can be seen to be dependent on each other's existence but they are fundamentally different self-organizing systems. This distinction is constitutive and ontological by nature where ontologically different entities are complementary for each other. In the framework of an ICT based operation environment, technology, learning as an individual practical process and education as a culturally defined institution can be seen to be ontologically different, but complementary. From the social systems theory point of view, these entities can be seen as an environment for each other (Vanderstraeten 2000).

The question in multidisciplinary research is whether there is any shared common ontological assumption about the research target among the different research. The ontology can be similar or complementary in order to form a common ground for the research. The interim understanding based on the context analysis is that there are different ontological assumptions in current research on ICT integration in education but without any integrating or complementary framework. The fact that there are so many different concepts and words defining the phenomenon of ICT integration in education tell us that there may be a different understanding of what they are researching. Not all concepts can be symbolic generalizations of the same phenomenon.

CONCEPTS REFERRING "DIRECTLY" TO THE PHYSICAL WORLD, TECHNOLOGY AS PHYSICAL OBJECTS

It is quite obvious that in many of the articles there are expressions related to ICT integration in education which are derived from technology itself or refer directly to technology as an object. The only difference in these expressions is

the level of complexity. The very concrete expressions refer directly to the physical equipment, like “a PC”, “a computer”, “a CD-Rom”, *etc.* The next level is to refer to a computer network, web or Internet, which can still be seen as referring to technology as such, directly without metaphors, but is not concrete any more. A more general expression related to the new operation environment in education is to refer to technology as a general substance by using words like “technology”, “ICT”. This style is used in the research to maintain relative neutrality and to give an impression of exact and scientific expressions.

In many cases the idea of referring to a physical device like a computer comes from a practical notion that there is new equipment in our physical world which changes the school’s or the classroom’s physical environment or the environment where the teachers and learner are living. One common concern for the research is what kind of the skills users need to cope with this new environment. According to this type of research, new technical devices are nothing more than advanced and demanding new objects or machines to operate with.

Many different expressions pointing directly to technology appear in the analysed articles. Those expressions that are not really describing ICT integration into education in a micro-context are not related to the topic of this research and therefore are not analysed. Only those expressions referring to the operation environments in education have been noted. For example, “*The Integrated Service Digital Network (ISDN) is a high speed, fully digital communication technology used primarily for interaction of voice, data and image over telephone lines*” (EMI2000-1-1) is not related to the use of ICT in education and therefore is not included in the analysis. “... *use of computers for undergraduate mathematics on the and grave;stand alone’ scenario...*” (C&E2001-3-8) is using direct technical expressions and is describing the use of computers in education and therefore included in the analysis.

When referring to ICT integration in education, the research articles are often using quite generic expressions of technology. This could mean that the differentiation of the role and nature of technology in general is poor in the research of ICT integration in education. The other general expressions were using some other references to the technology like ICT, Computer IT, equipment.

In connection with directly referring to technical devices, a “system” metaphor was also extensively used. Especially those documents which were classified as technology oriented contained references to a “system”, which basically indicates that the “system” metaphor has been used as a synonym for technology in general. In socially oriented articles and learning oriented articles system reference was not so popular. Of course the number of the references does not tell us anything other than the frequency of expressions; there is still a need to look closer at the micro context of these expressions.

The following chapters will analyse the system expressions more closely and will draw a conclusion on the nature of the metaphorical expressions in the research on ICT integration in education requirements on which great nations are built. It is an investment that takes its time to pay dividends but, according to economists, education generates the highest returns when compared to any

other avenues where resources can be committed. In developing countries, where a large population lives at subsistence levels, primary education is a major tool for enriching human capital. At the primary level, young minds are enlightened to accept new ideas, show creativity, develop critical thinking and above all, enable themselves to absorb surrounding information for informed decision-making at any later stage in life. In this regard, computer studies or ICT becomes immensely important. How essential is ICT or computer education at the primary level? This question is worth exploring given that our children are growing up in an information age— and not in an industrial age.

The argument that we are so underdeveloped and devoid of basic infrastructure that we cannot even afford to think about computers is not very valid any more. With decreasing cost and increasing usability of desktop PCs – which in fact face the threat of extinction at the hands of laptops – has turned the situation from bleak to bright. It is now a matter of choice, rather than availability to introduce ICT at primary school level — at least in the urban areas. Here, it is important to note that there are two very different and distinct aspects of ICT in education. One is teaching ICT itself, and the second is using ICT as an augmented tool to the existing teaching methods which is more important, it will be very useful if the people study from MCSE, CCNA, CompTIA, IBM, Citrix.

VIEWS ON THE NATURE OF INFORMATION TECHNOLOGY

It seems obvious that a world with information technology is somehow different from a world without information technology. But what is the difference? Is it a difference of order (faster, closer, clearer, etc) or is it a difference of kind? How can we make sense of these questions? Does technology shape society or society shape technology, or both shape each other? What is the nature of this shaping? Is it in practices, in ways of thinking, or is it more fundamental? The answers to these questions will obviously influence the judgments we make about the social and ethical implications of information technology when we consider the policy and practical concerns of using information technology in a particular domain (such as commerce, education or government).

The answer to these questions are also grounded to a large extent in one's particular, implicit or explicit, ontology of information technology itself; what is the nature—way of being—of information technology as such? Obviously many different ontological positions are possible and have emerged. Nevertheless, it may be useful for the purposes of this entry to discern at least three contrasting and prevailing views.

INFORMATION TECHNOLOGY AS AN ARTIFACT OR TOOL

The most common view of information technology is that it is an artifact or tool simply available for humans to achieve their objective and outcomes. Some of these tools might be useful and others not. When users take up a tool or artifact (word processor, mobile phone, etc) it will tend to have an impact on

the way they do things. For example if I write with a word processor I would tend to have different writing practices than I would with pen and paper. According to this view, we need to understand the impact that information technology has on society as it is taken up and used in everyday practices.

For example, how will communication with mobile phones change our social interaction and social relationships? In asking such a question this view does not primarily concern itself with the development of the technology—why and how did it come about in the first instance. It mostly assumes that the particular technology—mobile phones in this case—operates in a more or less uniform manner in different social settings. In other words, it assumes that a particular technology has certain determinate effects on, or in, the context of its use.

This way of conceptualizing information technology leads to questions such as “what is the impact of the internet on education” or “what is the impact of CCTV on privacy”. This view of technology is often criticized for a greater or lesser degree of technological determinism. Technological determinism is the view that technology more or less causes certain ways of doing or ways of organizing to come about. For example, a technological determinist may argue that the Internet’s open and non-hierarchical architecture can more or less *cause* a society that uses it to become more open and less hierarchical. The work of Postman (1993) is an example of this type of critical evaluation of the impact of technology on society.

INFORMATION TECHNOLOGY AS SOCIALLY CONSTRUCTED ARTIFACTS AND ACTORS

Many scholars argue that the ‘impact view’ above of information technology does not give an adequate account of the relationship between information technology and society (Bijker, Pinch, and Hughes 1987, Bijker 1995, Law 1991, Latour 1991). Firstly, it does not take into account that the technology does not simply appear but is the outcome of a complex and socially situated development and design process. In this development and design process many alternative options become excluded in favour of the technology that is now available—obviously with important implications. In other words there are many cultural, political and economic forces that shape the particular options suggested as well as the way the selected options become designed and implemented (Bijker, Pinch, and Hughes 1987).

It is not only technology that ‘impacts’ on society; technology itself is already the outcome of complex and subtle social processes—in other words it is socially constructed. Moreover, they argue that when we look at the actual uses of particular technologies we discover that users use them in many diverse and often unexpected ways—leading to many and diverse unintended consequences.

Both in its design and in its actual use there is an ongoing reciprocal relationship in which society and technology co-construct each other; they act through and upon each other. It is therefore very difficult to make general statements about the ‘impact’ of a technology. One can, at most, speak of some general trends for which many exceptions will invariably exist. For the

proponents of the this constructivist view it is important to understand, through detailed descriptive accounts, the particular ways in which technologies emerge and become embedded in particular social practices. Examples of such studies can be found in the work of Bijker (1995), Law (1991) and Latour (1991).

THE DEVELOPMENT OF INFORMATION TECHNOLOGY

The key technology in micro-electronics was the transistor, invented in 1947 at Bell Laboratories in Murray Hill, New Jersey, by three physicists, Bardeen, Brattain, and Shockley, who were later awarded the Nobel Prize. Other key technologies were the use of silicon as a medium (1954) and the integrated circuit (1957). Together these three made the development of semi conductors and microchips possible, and the price of these dropped very rapidly in the years that followed (85% between 1959 and 1962, and from \$50 dollars for an integrated circuit in 1962 to \$1 in 1971). The microprocessor chip was invented by Ted Hoff of Intel in 1971, and these gradually became more and more powerful.

Computers really began with the first general purpose computer, the ENIAC (Electronic Numerical Integrator and Calculator) in 1946. This was a huge monster, weighing 30 tons and consuming enormous quantities of electricity. Many of the early computers were made by business machine companies, most of which went out of business as the new specialist computer companies appeared, and much of the funding came from the government and the defense industry. Gradually the market settled down into large mainframe computers, and smaller mini computers, and for the most part they worked with punched cards and paper tapes rather than keyboards. Together with screens, they came later.

With the invention of the chip, costs went down together with size, and the power of the machines increased rapidly. By the early 1970s, powerful programmable calculators had begun to appear, and they rapidly became smaller and cheaper. In the mid 1970s, personal computers also started to appear, notably the Apple I, and Apple II, “the first commercially successful microcomputer, realized in the garage of their parents’ home by two young school drop-outs, Steve Wozniak and Steve Jobs, in Menlo Park, Silicon Valley, in a truly extraordinary saga that has by now become the founding legend of the Information Age.” (A film about this period came out a year or so ago, called ‘Pirates of Silicon Valley’, mainly about Bill Gates and Steve Jobs). The Apple Macintosh followed in 1984. The company, which started up with capital of \$91,000 dollars, had sales of over \$500 million by 1982. IBM responded to Apple by producing its own Personal Computers (PC) which were the ancestors of the Windows machines at the present day. It is important to remember that the cost of storing information has halved about every six months since then, and that the desk-top computers soon became as powerful as the mainframes of only a few years before.

Silicon Valley itself is in Santa Clara County, about 50km south of San Francisco, and very near Stanford University. The growth of this rural area as

the center of the high-tech industry began with Frederick Terman, the dean of engineering at Stanford. He helped two of his graduate students called Hewlett and Packard start an electronics company in the area in 1938, and the firm became wealthy during the War. In 1954 Stanford hired Shockley, the inventor of the transistor, and he recruited a group of eight bright young engineers, most of them from the Bell Telephone labs. Relations between Shockley and his engineers were not particularly good, and his company collapsed, but the engineers went off and started their own companies, and from these grew half of the 85 largest American semiconductor firms, including Intel. Stanford replaced MIT as the major center in this kind of research.

The new firms were much more flexible and innovative than the older ones in the East, and they shared information at informal meetings. One of such gatherings was the Home Brew Computer Club, who included Bill Gates, Steve Jobs, and Steve Wozniak, and an article read at a club meeting stimulated Wozniak to design his Apple I machine with Steve Jobs in a garage in 1976. Gates founded Microsoft at around the same time. Now in addition to the original companies, Japanese, Taiwanese, Korean, Indian, and European companies have also moved in. A lot of business comes from Hollywood, with its demand for computer graphics and special effects, so that the computers are just one part of a multi-media industry.

IT AND GLOBALIZATION

The effects of information technology have been to speed up the processes of globalization in the world economy. After the Second World War, the costs of research and development very quickly led to the development of multinational corporations, and with the decreasing cost of transmitting information these have been able to organize their research and production on a global rather than a national or even a regional basis. Three interdependent core areas of the world economy have emerged – North America, Europe and East Asia. The rise of information technology is also linked to the development of a global currency market, based in the three world cities of London, New York and Tokyo, and the rise of financial services industries which are also based there as well. (This is the theme of Sassen's book mentioned earlier.)

Deregulation of the currency markets mean that capital can be transferred anywhere in the world electronically, and there is a vast subsidiary industry of people making money through betting on future currency movements. The result has been to amplify instability in world markets, and of course to marginalize even further the areas and people outside the reach of this new technology. And it is the corporations which have flexibility and which are able to adapt quickly which have been particularly successful in this kind of environment.

The East Asian corporations were particularly well placed to take advantage of this new technology, because of the nature of the links between them. The Japanese industries were organized around the *keiretsu*, networks of companies both big and small, with one or other of the large banks at the center. Along with the growth of the giant corporations has gone the 'small is beautiful'

philosophy, and Japan combines the two ideas, with huge companies sitting at the top of a hierarchy of small family businesses. The Chinese businesses in East Asia are linked together in a similar way through family ties, which give flexibility in terms of flows of capital, loans, information, and so on. But the network enterprise is also marked flexibility of employment, the collapse of traditional work patterns in many cases, and the massive influx of women into the labour market – often at lower rates of pay than their male counterparts. In the UK this took place during the Thatcher period of the 1980s, and in Japan it still seems to be taking place at the moment.

In the second volume of *The Information Age, The Power of Identity*, Castells looks at some of the social impacts of these changes. The shift of power in the work place, the breakdown of traditional patterns of employment and the gender division of labour, has, Castells argues, produced a crisis in the family. ‘Normal’ families with husband, wife and their children living together have now become the minority rather than the norm, thanks to the increasing divorce rate, and alternative lifestyles.

The reaction has been in many cases religious fundamentalism – one of the attractions both of fundamentalist Islam and Christianity is that they seem to restore the balance, with a heavy emphasis on the integrity of the family and patriarchal dominance – the woman’s place is in the home. Many of these groups are also opposed to what they see as the New World Order, dominated by the United Nations and similar international organizations, so that much of the resistance to globalization is coming from ethnic, extreme nationalist and religious groups. Resistance to the new global order has resulted in the flowering of a diversity of cults and social movements, from fringe cults such as AUM Shinrikyo in Japan to environmental movements of various types both regionally and world wide, and there are lengthy discussions of both of these.

Finally, of course, the state itself has been weakened by these processes of globalization. Increasingly they are unable to stop flows of capital, or flows of information, or to prevent the major corporations from moving industrial production to other regions of the world. Democratic processes have been profoundly influenced by television, especially in the United States, so that real debate has been replaced by the production of ‘sound bites’ and video clips endlessly repeated on television talk shows, and the politics of scandal, reducing the political process to the format of a soap opera.

The final volume, *End of Millennium*, returns to the global economy, and looks at the role of the state in the economic process.

THE COLLAPSE OF THE SOVIET UNION

There is a lengthy discussion of the collapse of the Soviet Union, which Castells argues had actually been more successful economically than is often thought nowadays. The Soviet Union actually survived a series of major disasters, from the civil war after the Revolution and the purges of the Stalin period to the Second World War (in which 25 million Soviet citizens died) – and still managed to re-house almost the entire population and gain a technological lead over the US in space research by the mid-1950s.

The collapse of the Soviet Union, Castells argues, came about not because socialism itself was inherently flawed, but because the Soviet version of it, with heavy state control, was unable to manage the transition to the new informational economy. This was because the economic growth which made victory in the Second World War possible was based on state planning which was largely insulated from the rest of the world and which could not adapt to the new conditions. Much of the production was in any case for defence, and did little to increase the standard of living of the average citizen.

Despite its successes in space, and despite producing some of the best mathematicians in the world, the Soviets fell further and further behind in information technology. They could design theoretical chips, but lacked the facilities to actually make them! The crucial decision was to base their computing systems on IBM technology which by the 1960s had become the best in the world, rather than develop their own systems. (One of the reasons for this was that the Soviet generals wanted the best available hardware for the military.) From then on the Russians were dependent on increasingly obsolete systems borrowed or pirated from the West, and they were soon 20 years behind in computer design. Even copying and typewriter facilities were tightly controlled for political reasons.

Finally, the growth of the system meant that there was a privileged class of officials who benefited from it – and who resisted change. In the 1980s, Gorbachev tried to reform the system with the two famous catch words of *perestroika* (restructuring) and *glasnost* (openness) – and an attempted counter-coup by senior officials in 1991 led to the collapse of the Soviet Union itself.

GLOBAL CRIME

In the aftermath of the collapse, organized crime has flourished, organized partly by former party officials, especially in the republics of the Caucasus and Central Asia. Castells and his students have also carried out a good deal of research into the drugs trade in Latin America, and the various cartels which organize it. One of the features of organized crime world wide is the increasing integration of the various regional mafias which control it, and the amounts of money in circulation are staggering. The whole system incidentally is based on the criminalization of drug taking in the US – it seems that the government learned nothing from the prohibition experience during the 1920s which established the Mafia with a power base in terms of wealth and influence which they have never lost. Ban something which is in heavy demand, whether it be booze, drugs or sex, and the result is a black market and organized crime.

THE ‘FOURTH WORLD’

Much of the attraction of criminal activity lies in the fact that there are few alternative sources of income for many people, especially in what Castells calls the ‘fourth world’. These are the regions and peoples excluded for one reason or another from the new information economy. It includes whole regions – such as Sub-Saharan Africa – where the increasing struggle for survival has led to the

collapse of economies and regimes and an upsurge in inter-ethnic violence, resulting in almost perpetual civil war in states such as Liberia, Sierra Leone, Zaire, Somalia, Rwanda and Burundi.

But it also includes the excluded minorities in the core industrial countries, especially the United States. One of the features of the labour market resulting from informationalization is polarization – while the rich are getting much richer, the majority, even in the United States, are actually getting poorer, and an increasing proportion have literally no assets at all. Things are worst in the ghettos, with high rates of crime – so that a large proportion of the younger men are either in prison or on probation. More hopeful is his discussion of economic growth in East Asia, but even here clearly the statist model which brought about economic growth in the postwar period, first in Japan and then in the four little tigers and China itself, is under strain from the informational economy as we move into the 21st century.

COMMUNICATION TECHNOLOGY IN SCHOOL EDUCATION

Technology is rapidly changing in all spheres of life, so in education. It has become very necessary to know how we learn, how we express ourselves, and how we perceive and interact with our world. As a means of responding to the change and surviving in an increasingly competitive educational environment, management institutes must develop a strategic plan for enhancing management education and value adding to the existing system of education. As a means of achieving the aforesaid goal the use of computers and other technology in support of student learning, accommodating the full range of learning styles and special needs, and fully integrating technology into the curriculum has become extremely needful in this hour. A lot of related issues are also involved in such a process as this includes administrative, planning and budgeting; professional development for teachers and administrators; and, very importantly, ensuring equity of access and use. The current emphasis is ensuring that technology is used effectively to create new opportunities for learning and to promote student achievement.

In almost all management institutes the main focus is laid on the employers need who prefer: This has been derived somehow from the student's psyche as success for them is a respectable degree, good education, good job and higher salary, to meet such a demand each management institute should plan strategies to enhance the learning experience of the students so that they get better value of management education and have a better prospect in job market.

Some basic principals of good teaching are never going to change even teaching involves the use of ICT, as this has been found by many researchers that it remains a matter of concern for teachers who are not able to shift from traditional class rooms to a modern technology driven classroom. It is central to the role of a teacher to help pupils learn.

As the nature of what is to be learnt changes, so does the role of the teacher in that process. The teacher was once the sole source of information and was expected to know all the relevant knowledge and to transmit it effectively to the

pupils. But now with the advent of various technologies, when we sometimes find that some students do have access to more information than any teacher can ever know, thus it has become very necessary for a teacher to change the role of being an instructor who was considered as a source of all knowledge to a facilitator who by the experiences, knowledge and skills help students, learn, understand, evaluate and communicate knowledge.

The role of the teacher is not being diminished but changed. What is necessary above all is that teachers develop the confidence that they are important to their pupils, not because they happen to know some facts that pupils do not know, but that they have a vision of what they want pupils to be educated in as well as the requisite knowledge, skills and understanding to facilitate and monitor pupils' progress. The fact that pupils may know more about the operation of a piece of software than the teacher can be of benefit to both.

When computers were first brought in as an educational tool, many articles, press releases gave a very fearful idea to the teachers about "teacher less classrooms". But truth is technologies do not do the way it was depicted. There is no simple way to implement new procedures. But if the process is thought through and well handled, the dividends can be huge. As business schools experience increased competitive pressures, information technology is one area that schools might use to differentiate or compete with or, more importantly, to use as a catalyst for transforming educational processes. ICT has definitely proved out to be an efficacious means of enabling intentional changes in teaching and learning processes.

Before discussing the technologies available for it, becomes very important to discuss the learning models and Role of ICT.

OBJECTIVIST MODEL (YARUSSO 1992)

This model assumes that the goal of teaching is to efficiently transmit knowledge from the expert to the learner. The lecture method of teaching embeds the pedagogical assumptions of this model. The transfer of knowledge can be by the means of electronic presentation. The softwares which are easily available, like power point etc can be used. If the faculty wants to make the presentation more interesting other softwares like macromedia director (for giving interactive effect) media player (to display some clips related to the topic) *etc.*, can be used.

CONSTRUCTIVIST MODEL (O'LOUGHLIN 1992)

It calls for learner-centred instruction: individuals are assumed to learn better when they are forced to discover things themselves rather than when they are told, or instructed. It is found that the learner develops the skill hypothesizing, predicting, posing questions, researching answers, imagining, investigating, and inventing. Following this model ICT's role in imparting knowledge is by providing a particular problem area by the faculty. Rest finding the answer by the students can be by the use of online databases, internet search engines or CD-ROMs or electronic library.

COOPERATIVE MODEL OF LEARNING (SLAVIN, 1990)

The major goal of cooperative learning is the construction of shared understanding through interaction with other individuals, an implicit goal is improving communication and listening skills and eliciting participation. One implication of the cooperative model for instructional methods is that the instructor's role is to facilitate maximal information and knowledge sharing among learners rather than controlling the content and delivery of learning. This can be brought about by networked computers where each and every individual learner and instructor is able to view the work of everybody in the classroom.

Higher education is beginning to change in response to providing educational opportunities to an increasing diverse population of students. A new type of university emerged in the last 25 years which John Daniel (1996) thinks will hold lessons for the renewal of all universities. Called "mega-universities".

Prominent Business gurus have given traditional universities just 30 more years before dying off (Cunningham et al., 2002). As radical as their predictions may be, it does require colleges and universities to take seriously the changes and challenges that technology will bring to them in the 21st Century.

The utilization of educational technology up to this point has given rise to the opportunity and potential of restructuring the educational system to extend the learning environment beyond the four walls of the classroom. In order to integrate technology and education we must first develop our view of the revolution that technology is creating in education, and appropriately incorporate it into the system (Chen et al., 2006). This in turn will influence cultural changes in the education system, and technology is also often assumed to be the catalyst of new pedagogical change towards e-learning.

Distance educators have had to redefine their communication skills. They have found that two-way interaction is a critical feature of the educational process. Educators must communicate progress to learners as well as engaging the learners into the e-learning environment.

For Distance Education to be successful, high levels of interaction typically need to be present for learners to have a positive attitudes and greater satisfaction. Two-way interactive technologies (e.g., video, audio, audio graphics, and computer conferencing), while capable of providing two-way interactivity, still depend on user skill to successfully bring about interaction in an instructional context.

The current distance education literature addresses distance interaction from the learner's perspective. Shea, Motiwalla, and Lewis (2001) conducted a study to investigate the status of distance education (DE) at 68 higher education institutions. The number of DE students continues to grow. This tremendous growth can be attributed, in part, to shrinking budgets and lower local student enrollments at universities. DE via the Internet provides them with a low-cost, flexible option to expand into global markets (Casey, 1998). Distance education can provide a strong interaction between the learner, learner/instructor, and the content as well as other learners. There needs to be a distinct interaction with

learners and high technology devices. Hence, the four typical types of interaction for distance learners are: (a) learner-content, (b) learner-instructor, (c) learner-learner, and (d) learner-technology. However, distance instructors develop similar, although relatively different, instructional interactions: (a) instructor-learner, (b) instructor-content, and (c) instructor-technology.

These instructional interactions are complex processes; the literature recommends that instructional designers keep them in mind to produce effective, efficient, and quality distance education courses. Transactional distance included the distance that exists in every educational relationship. There has to be a certain amount of structure in distance education that fosters a certain amount of dialogue between the learner and instructor.

On the other hand, Social Presence is a strong communication component that reduces isolation between the distant learner and other learners and instructor. Lack of social presence might affect learner's performance and outcomes during the instructional transaction. Social presence is the degree to which a person is perceived as a real person in a mediated situation (Short, 1976). The notion is that social presence can be transferred both by the medium itself and by the people using the medium for interaction. Transactional distance and social presence are strongly interrelated and together influence the learner's control of the learning process.

9

Development of Education and Curriculum

Photogrammetry technology is gaining popularity among the user communities due to its varied advantages and applications in many fields. Photogrammetry is a part of remote sensing, which involves viewing objects stereoscopically to make accurate measurements. The word photogrammetry, like many other words got its name derived from Greek words; photo—meaning light, gramma means graphy/drawing and metry meaning measurement. Photogrammetry is defined as the art, science of obtaining reliable information through the process of recording and taking measurements from photographs. This technology enhances vision so that objects, areas are imaged with overlap with the help of high precision metric cameras.

In the recent years due to the requirements of large scale maps with more accurate height information of the buildings and terrain, Photogrammetry has become more popular and getting more popular in India. There is a need to have trained and highly skilled manpower in this emerging area. As the rate of science and technology development is going more and more faster in the field of photogrammetry, the methods and scopes of the education and training need to change and should be able to cope with the advancements. Because of the integration and development of photogrammetry with GPS, LIDAR and GIS, Photogrammetry curriculum has become a compulsory one of the professional technology. Why Photogrammetry

We all have seen some kind of maps in our life. With these maps we are able to represent the shape of the object, place, extent and boundary of the country, *etc.*, If we could imagine these maps in three dimensional. Yes, it will be really

of great use in understanding the topography of the land. We can see the Himalayan ranges with its crest and trough. We can see the Deccan plateau, the Indian ocean, the western and eastern ghats in its relative elevations. We can have a better idea on the estimating the distance between two places, volume, surface area, slope, *etc.* These types of maps are possible to prepare with the Photogrammetry technique. The same types of maps are possible to prepare with conventional ground survey technique but Photogrammetry is used for the following advantages:

- The ground method is a long-established process and is relatively slow and expensive
- Can be mapped at office irrespective of different weather conditions
- Less Ground work
- Cost and time effective.
- More accurate, precise 3D mapping
- Error due to slope is removed.
- Permanent record of physical features-Photo
- So verification of data at office is possible.
- Easy updation possible-contributing to ease of maintenance.
- Slope of the fields are also generated which are very valuable.

Principle of Photogrammetry: Photogrammetry is mainly known for its stereo-scopic model for determination of height. The 3-dimensional view of a photographed object kindled the imagination of various scientists, which has led this field to extent of virtual reality-3D animation. A 3-dimensional model gives a better way of understanding about the nature of the object rather when it is shown as elevation, top view or section.

A very common man can also be able to appreciate the usefulness and for assessment. The basic principle of photogrammetry is our normal human eye-our vision. We can be able to feel the height difference of one object relative to the other, if we see with our two eyes. With one eye we may not be able to feel the height difference.

Stereo scopic vision of Photogrammetry has its principle here. If we would be able to see one object from two different positions (left eye and right eye) we can get the stereo (3D) view. So if a same object is photographed from two different positions relative to our eyes, we will be able to get the 3D picture of the object, *i.e.*, depth perception is achieved. This forms the basic principle in photogrammetry. To view the same object from two different positions aerial photos from airplanes are taken with regular overlap successively to have a seamless stereo view of the entire area.

These overlapping photographs if could be kept in the same orientation as at the time of photography the 3D view of the object is created. The 3D model thus created should then be used for taking measurements which is the main objective of photogrammetry. For taking a measurement, the 3D model need to have some reference to start with. To refer the model to some coordinate system, for taking exact measurements as it is in the ground reality, control points, normally referred as ground control points are collected. After having oriented the 3D model to the ground reality, any measurements taken thereafter are as

same as it is taken in the ground. To perform all these operations the photogrammetric process called interior, Relative and absolute orientation were preformed.

Aerial Photography: The stereo captured maps created only can have the accurately interpreted and captured features only. As such it don't have information of the nature of terrain. Whether it is of steep slope, gradual slope, highly undulated terrain, hills/valley.... Nothing will be able to get from that. To represent the terrain, Digital Elevation Model (DEM) which is a continuous representation of the change in the elevation of the terrain and the contour (lines joining equal elevations) can be generated.

For the people who may be interested in working with the monoscopic images for mapping, ortho photographs (having uniform scale, free of normal errors of photography) are useful. With these products of photogrammetry, mapping of any area to the actual size, shape and position will come to reality.

Photogrammetry: National Remote Sensing Agency in India, is the authorized agency for carried out the aerial photography for commercial users of various government and private agencies. Aerial photography was also carried out mostly in the past for disaster management like flood, earth quake, landslide, forest fire, coal field monitoring, *etc.*, Various types of sensors like black and white, colour, infra red, multispectral scanner are been employed for aerial photography in India. Because of the highly restricted nature of aerial photography, the use of photogrammetric techniques was confined to a smaller circle. This was originally practiced by Survey of India, National Remote Sensing Agency and other state Remote Sensing Agencies. Aerial Photography can be had by any government or private companies after getting the clearance from ministry of defence.

Potential for Photogrammetry: Due to the invention of computers the era of analog photogrammetry systems (fully manual) took a change towards analytical systems, where most of the computations were performed automatically through use of computers. Due to further advancements in the field of computers, new techniques of object and pattern recognition, high-speed processors, large storage disk space, *etc.*, digital photogrammetry has come to existence. Because of the various advantages and speed of processing of data in digital environment with a very low cost, digital photogrammetry has got a good potential in the world market.

Aerial Photography and the outputs of Photogrammetry can be used for town planning, utility mapping, tax assessment, flood mapping, forest fire mapping and monitoring, mining, Earth Quake/volcanic damage assessment, *etc.* The police can use these technology for crime analysis and riot management. Highway planning, Railway alignment, pipeline survey, Irrigation canal alignment and management, New layout designing, 3D City modelling, power line monitoring are few other application areas. Close Range photogrammetry, a branch of photogrammetry is nowadays been used extensively in the field of medicine, various industries, *etc.* The permanent stereo record of the existing monuments and archeological importance structures can be made with photogrammetric techniques.

In India many municipal and metropolitan authorities of various town and cities are in need of large scale accurate mapping for the infrastructure development and planning activities. Bangalore Development Authority, Hyderabad Metropolitan Water Supply and Sewerage Board, Rajasthan Urban Infrastructure and Development Programme *etc.*, TCPO under MoUD., had already started using these technologies to create large scale maps for use in Geographic Information System (GIS).

Private participation in the field of digital photogrammetry also are increased. Infotech Enterprises Ltd. Hyderabad, DSM soft (P) Ltd. Chennai, Kampsax India (P) Ltd. Delhi, Rolta India, Mumbai, Speck Systems Hyderabad, Genesis of Bangalore, IIC technologies of Hyderabad and so many other companies are practicing digital photogrammetry in India. As of now the job potential in these industries are more for trained and skilled Photogrammetry operators and managers. In a recent study made, it was felt that the potential for large scale mapping and GIS activities are about 55,000 crore for India. Such an huge untapped market is present in India.

Photogrammetry Education: Though, potential market for Photogrammetry exists in India, the formal education in the field of Photogrammetry is very less. There are very limited numbers of institutes which offer Photogrammetry course. Institute of Remote Sensing, Anna University has a unique four-year bachelor programme (Geo-Informatics) and a M.Tech Programme in Remote Sensing which gives main emphasis on photogrammetry and Remote sensing. University of Roorkee, currently given the IIT status is also having very good curriculum for photogrammetry for its M.Tech programme. Apart, IIT Kanpur, Chennai, Mumbai also provides Master degree in Remote Sensing and GIS. Apart from these few other universities and colleges like JNTU, Hyderabad, BITS also provide Master's degree course on Remote Sensing and Photogrammetry.

In India, the Survey of India has its own "Survey Training Institute" (STI)-Hyderabad, which imparts training in photogrammetry. National Remote Sensing Agency (NRSA) also gives training in Photogrammetry, Remote Sensing and Geographic Information System (GIS) in its main campus in Hyderabad and in Indian Institute of Remote Sensing (IIRS)-Dehradun. Apart from this Institute of Remote Sensing, Anna University-Chennai is also conducting training programmes in photogrammetry. Other than these government agencies many other private companies are also giving training on the basic theories and operation of various commercial digital photogrammetric systems.

We need to accept that the state of art facilities in the field of Photogrammetry is largely absent in many of the institutes. Availability of trained and highly skilled staff in teaching the fundamentals of Photogrammetry is very less. Many of the private training institutes except a few, wants to cash on the potential market. So the fresh graduates from various disciplines are trained on commercially available digital Photogrammetry software for stereo perception and were certified for acquiring the Photogrammetry training on principles and concepts. Even though, the candidates were able to perform their jobs in private companies, they were not able to go forward in their career after a certain limit due to lack of technical competencies. This has created a wide gap in the

Photogrammetry industry. It is a fact that many industries are still in look out of potential candidate to head their divisions independently. It is a fact that many of the GIS and RS professionals are not aware of the concept of scale and its related accuracy factor in terms of information content and positional accuracy content. Because of the availability of cheap and skilled manpower, Indian companies are able to get more projects. But the companies also should realize that apart from just a 3D data conversion companies, they should get transformed into the complete solution providers in this area. So they also need to encourage the staff and provide guidelines for their staff in identifying the quality institutes offering Photogrammetry education.

Curriculum Development: Photogrammetry is an complex subject which need to have a trained, skilled with oral and written communication staff to explain the concept in Photogrammetry. The complete mathematical concepts and complex earth surface, geodetic concepts need to be explained to the students in a much simpler way. Any student can be made interested towards the subject in 2 ways.

1. Complex and dry subjects can be made interesting by the way of teaching with visual aids, creating competition among the students, with examples of live and day to day activities.
2. By creating a good job potential in the market for his/her career advancements

The job potential in India for photogrammetrists is more in the current market. It is now with the institutes to produce quality and skilled manpower. The Institutes need to find the ways and means of augmenting their existing facilities with the state of art software and hardware. In the current scenariao, there are many commercial software available with varied functionality and cost. There are software which are available for lesser cost which can suit for educational version in understanding the concepts.

Virtual Campus: The use of computer networks and information technology are becoming an important part of the everyday work on almost any profession, especially in the scientific areas and changed education concepts. Some of the institutes/universities and software vendors or distributors can plan new strategies concerning computer based technologies and to start virtual campus for students to learn the Photogrammetry technology through the internet.

The concepts and materials can be explained through multimedia presentations. Computer Aided Education is well in practice in other fields. These methods have been utilized and developed more than for fifteen years in many universities and organizations. The goal of this is to develop the learning capacity of students and increase the teaching productivity and effectiveness of instructors with the help of advanced computer based technology. This technology should be an integrated part in the education. It is also desirable to use this technology to develop attractive courses for distance education. Another area of interest is to use computers, information technology and equipment to develop attractive and understandable demonstrations of basically tasks and typical projects in the field of Photogrammetry.

General awareness on the potential of the market also need to be created with the various government agencies and should be highlighted of the potential and use of the technology at grass root level. To be in pace with the emerging

technologies, new techniques and advancements like Computer Graphics and Data Visualization, Machine Vision and Image Matching Techniques, Advanced Computer Programming in Geomatics, Spatial databases, automatic feature extraction techniques with neural network and fuzzy logic algorithms, artificial intelligence system, principles of LIDAR/LASER, *etc.*, should be included in the curriculum. The curriculum also should be revised every five years keeping in view of advancements and potential demand in the field.

Future of Photogrammetry: The advancements in the field of Survey have reduced a lot of fieldwork that needs to be carried out in the field. The use of Global Positioning System (GPS) has now revolutionised the entire field of Survey and Photogrammetry. The initial steps of creating the stereo vision is now been greatly reduced in such a way that we can create stereo models without the brain staking efforts of orientation process. The use of digital cameras has also reduced the time taking process of processing the negative, creating the positive prints and then again scanning to work in digital environment. We can directly go for mapping after getting out of the aircraft. Some research works need to be carried out to make this operational for large production projects.

The availability and use of high-resolution satellite images like IKONOS, has now made the mapping on large scale to be a reality with a comparatively lesser cost. The availability of stereo satellite images has increased the potential in the field of satellite photogrammetry. The future Indian high resolution Satellites Cartosat I and Cartosat II proposed to be launched in the next 2 years may also increase the use of stereo satellite data at a relatively lower cost. With the availability of these stereo satellite images the creation of terrain to its true 3-dimensions can be attained for a larger area in comparatively lesser time at low cost. Large scale mapping for city planning can be done with these types of data very quickly. As these stereo satellite images are not much restricted as the aerial photography, city planning, Regional planning, *etc.*, can use these high resolution satellite images.

The very recent advancement is the Automatic Laser Terrain Mapping. The use of the LIDAR technique has now made the user community to get the 3 dimensional data of the terrain within no time. This is currently proved successful for large scale mapping in the western world. The operational use of this on large-scale mapping are planned to start in NRSA from 2004 for various applications like powerline monitoring, high precision DTM and contouring, terrain mapping, forest mapping, *etc.*

Facilities at NRSA for Large scale Mapping and GIS Solutions using Photogrammetry Technology: Photogrammetry is a very important tool in preparation of large-scale topographic mapping. Most of the city development plans can be made reality with these large-scale maps. Non availability of these maps in India is a greater drawback. Preparation of these maps with the conventional ground survey technique may take more time. By the time when the maps are finalised, the details may get obsolete due to the rapid changes and advancements. To meet the potential demand of large scale mapping needs, adoption of the modern technology is necessary. Trained and skilled manpower need to be produced by the way of innovative use of education and training. Universities and educational institutions should take the lead adopting the modern techniques and developments.

LEARNING ON AND OVER THE INTERNET

We live in a continuously shifting state of realities in which the only predictable constant is the inevitability of more change. This is the basic element of our Information Technology Era, which commenced with the development of the microprocessor (1973) and proceeds into the foreseeable future. The most recent impetus to microprocessor development, the convergence of technologies, is represented in embryonic form by the Internet, particularly the World Wide Web. This paper reports on the findings of an online investigation intended to explore the educational function of the Internet by analysing the ways learning opportunities are presented and utilised on and over it, in an attempt to understand the trends of changes in learning technology and how these changes affect adult learners.

Points of Departure: I based the planing of this investigation on reflecting on the observations made by Kirkup and Jones (1996) on open learning and distance education related to the concept and reality of a learning society. In particular, the issues raised in their chapter of whether new ICTs may “overcome the previous weakness of ODL without undermining its strengths”, and that, in a learning society, learning opportunities should be open to “all classes of society, especially those people who have had less formal education than the majority, and what usually follows from (this) lower income”, have been used as a measurement throughout the investigation.

Technological Determinism and the Network of Learning Society: The Internet is an evolving, growing entity aligned to continuous technological change. This constant change is instrumental in paradigm shifts in the development of learning technology. To some learners (and educators alike) it appears to have become too complex, too technical, and many make an assumption of technological determinism. There is no need to assume technological determinism, we can ensure that the development of technology will not be detrimental to learning and education.

Barry Jones (1990) uses the example of Los Angeles and the way the car and tyre industry was allowed to replace the public transport system with cars and freeways, as a warning that we should not accept the consequences of technological determinism, but that we have a choice in the way technology is used and developed. The development of the car was an uncontrolled, chaotic phenomenon with wide reaching “side-effects”, such as road deaths, urban sprawl and environmental pollution. This did not necessarily need to be the case, but was accepted as part of the development of technology.

The Alternative Network: In the educational field, as in the commercial, innovations may develop spontaneously. Some may be planned, such as in the commercial arena when a new calorie-controlled, portion-controlled, fixed weight chicken product is developed for sale to consumers at retail level because they are now cholesterol conscious and then diffuses to restaurants who in turn have expressed a need for such a product. Many developments have however occurred spontaneously from research with a different purpose, such as the

many offshoots of the NASA space programmes and the Internet from its 1967 beginnings as ARPANET, initially commissioned by the US DoD and the Pentagon, for military purposes.

What is the Internet?: At a technological level, the Internet is millions of computers (no one is quite sure how many,) interconnected through the worldwide telecommunications systems. All these computers are able to share information with each other because they use common communications protocols. At the human level, the Internet is the people who use those computers and the information they share. The people come from all walks of life, acting both as private individuals and representatives of organisations. Everyone on the Internet can publish information on any subject they wish, and almost everything published is available to everyone else. As a result, the content is staggeringly extensive and varied.

Finally, the Internet is a technological, social and cultural phenomenon, unlike anything the world has seen before. It has emerged as such not because of some ideology or social manifesto, but simply because of its anarchic technological structure. It might be seen as historical irony the reason that this network was initially built during the period of the cold war, which was to ensure that there would always be some means of communication in case the USA was hit by enemy nuclear missiles.

Unlike other human-conceived networks which exist since the beginning of humanity (*e.g.*, power and energy networks), the Internet is not owned by anyone. No one owns the Internet. It is shared, by the consensus of its users. It does not come from a place, or even a country. It recognises no political boundaries. It was not invented. It evolved, over three decades, from the desire of people worldwide to share knowledge and to communicate.

“Why do people want to be “on the Internet?” One of the main reasons is simple freedom. The Internet is a rare example of a true, modern, functional anarchy. There is no “Internet Inc.” There are no official censors, no bosses, no board of directors, no stockholders. In principle, any node can speak as a peer to any other node, as long as it obeys the rules of the TCP/IP protocols, which are strictly technical, not social or political. (There has been some struggle over commercial use of the Internet, but that situation is changing as businesses supply their own links).” (Sterling, 1993)

Trends in Technological Change: Different technologies and methods for educational delivery. People retain about 20 per cent of what they see, 30 per cent of what they hear, 50 per cent of what they see and hear, and up to 80 per cent of what they see, hear, and do simultaneously; to the extent that computer-based learning systems integrate these techniques, they can be very effective.

Technological change, occurring at a faster rate now than ever before, is having incremental effects upon communication and social interaction. Increasing sophistication in the technologies of communication and computerisation are decreasing the cost and increasing the availability of instantaneous communication across the world. Electronic Mail, video-conferencing and multimedia applications are just a few examples of innovative technology now being used in education.

The use of the Internet is growing exponentially, although it is not possible to measure accurately that growth rate. These figures are collated by one of the largest Internet hosts in the USA, using world wide surveys. They show that minimal figures of Internet hosts had reached approximately 13 million by mid 1996 and exceeded the 20 million mark by August 1997, of which approximately 5 million were European hosts representing a quarterly increase of nearly 15 per cent.. Of these, educational institutions as hosts (edu domains) had reached more than 2 million by June 1996 and neared 3 million in August 1997.

One of the implications of this is that our learning institutions and practices will change.

Moore (1995), refers to models explaining how educators will respond to new technologies:

- The minimal change model-in which instructors make no fundamental changes but merely use technology as an instructional aid;
- The marginal change model-in which the pedagogy and organisation of education remain unchanged and students are added on to conventionally taught classes (the most common application of distance education in North America);
- Systemic change in which institutions change the fundamental organisation of teaching by reorganising it into a system driven by technology; and a virtual system in which universities and schools are “place-free, with little or no formal organisation”

Only the last model acknowledges the existence of a paradigm shift. It differs significantly from Scott’s notions of the British perspective (Scott, 1993), as it attempts to do away with the established institutional culture. This model should flow on to changes in the text-paper based emphasis on knowledge and content, and to the training of teachers, and perhaps a redefining of the position of teacher from “teacher as knowledge source” to “teacher as facilitator of the learning process” (D. Spender, 1995, pp114ff).

Other implications of this are that there will be fewer on-campus students, more education over the Internet, more universities online, and “virtual degrees” through virtual universities. The methodology of education will change, becoming more varied and flexible. Isolated and other marginalised students will benefit-assuming they have the technology of access. An example of this trend is Ken Eustace of Charles Sturt University, Australia, who has received accreditation for an MA from Paideia University. Eustace is the first Australian academic to be awarded an online degree from a “Virtual University”. “The electronic transfer of a global Master’s degree over the Internet from Paideia University in Amsterdam to Perth in Australia six weeks ago signified the start of profound changes-and dilemmas-to the university system”, The ‘Australian’ reported on 6th September 1995. There is a wide spectrum of learning opportunities on and over the Internet, especially on the World Wide Web. The existence of Virtual Universities and Classrooms on the Net paves the way for wider access and participation for adult learners as it changes the philosophy and practice of ODL.

Hypertext, the nonlinear medium, a term coined by computer utopian Theodor Nelson in his 1974 ‘Computer Lib/Dream Machines’ to describe electronic texts

embedded with links to other texts is yet another tech-tool which enhances learning, breaks down the traditional linear narrative of the written word by encouraging readers/users/surfers to find their own paths through large amounts of information. His idea came to fruition with the advent of the World Wide Web, where “hypermedia” also includes sounds, pictures, and moving images. Hypertext was the first tool to enhance interactivity on the Net.

The capacity for learners to add to the dialogue through an interactive medium provides opportunity for development, application and linkage of new knowledge to the adults own learning context. The Internet recreates the ‘agora’ or meeting place in which knowledge is not only shared but created and recreated. Learners engage in active learning within conferenced environments where they take responsibility for their own learning processes. Learners “are required to examine thinking and learning processes; collect, record, and analyse data; formulate and test hypothesis; reflect on previous understandings; and construct their own meaning” (Crotty 1994, as quoted in Jonassen et al., 1995, p. 11) within an environment that gives the opportunity for students to interact together to build a community of learners.

Computer conferencing (CC), now common on the Internet, is a technology that facilitates interaction between learner and instructor and among learners and, potentially, opens the door to active learning. It creates opportunities for students to engage in the kind of active learning activities that Meyers and Jones (1993) and others identify. For example, CC allows the formation of small groups, creates opportunities for collaborative learning, discussion using case studies, role playing, simulations, online journaling, and provides opportunities to discuss and make connections between content and their own lived experiences. One such example could be the online experience I have had in attending one of the newly established OU courses which are delivered over the Internet.

A Case Study within the Project: Because of its asynchronous nature, CC-based group discussion allows for more thoughtful, well-constructed responses than one might find in a face-to-face classroom. Also, within the group context, students have opportunity to interpret and transform content (*i.e.*, make content their own); they can integrate new material with what they already know about the subject. Both large and small group discussion facilitates the active exchange of ideas and opinions related to specific content.

MZX205 is a computing OU course. It is delivered in the usual OU manner, plus the fact that OU offers learners access to its WWW and e-mail conferencing facilities over the Internet. Since the beginning of the term, I have accumulated 362 conferencing messages from the 21 fellow learners on the course. We have been discussing our common concerns on the course, facilitating each other and commenting on our work, flaming about and complaining, socialising in virtual reality, using our first names and showing intimacy rarely found in everyday acquaintance under similar circumstances.

CC mediated case studies and collaborative activities gave us opportunity to apply and test theory and knowledge to a “real-life” context. Specifically, collaborative activities encouraged mutual decision-making, and shared analysis

amongst group members (skills that are valuable in the work world!). Generally, we were required to produce some product as evidence of our collaborative efforts, such as a final report or posting which was presented online for comments from other students and the instructor.

Online journaling allows learners to reflect on content in a personal context, and to analyse and evaluate content in light of their experience. This reflection facilitates a personal level of integration and interpretation of content. Although an individual activity, journaling is, nonetheless, “active,” because it provides the opportunity for reflection on and “meaning-making” with regard to course content. (SCHANK, R. & CLEARY, C.1994)

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 (eg 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.

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 an overriding view removed from the minutiae 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: 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 constraints 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.

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 (CSRSD) programme, SEDL and other regional labs provided assistance including SEA network meetings, LEA assistance, development and dissemination of products to support CSRSD 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 CSRSD 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 CSRSD 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 CSRSD programmes.

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

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.

EVALUATION

Academic educationists have a rich background of theory and practice in course evaluation. Evaluation means discovering the value of a course or training programme. It means finding out if an innovation has been valid and useful, for whom and how it might be improved next time it is run.

Writers of a more technological persuasion limit evaluation to ascertaining the extent to which the course meets its stated objectives. However, since the 1960s this approach has been strongly criticised for its lack of relevance and utility. Cronbach (1963), for instance, argued for deeper analysis and broader descriptions of programmes as a basis for evaluation studies. Within another four years Scriven, Stufflebeam and Stake had introduced new models of evaluation that departed radically from the earlier approaches.

These conceptualisations recognised the need to evaluate goals, look at inputs, examine implementation and delivery services, as well as measure intended and unintended outcomes (Madaus et al, 1983).

There is no place here to describe the curriculum evaluation models which could be drawn on to review and assess training and evaluation, but it is worth listing some of the evaluation concepts which have developed in this field, such as goal-free evaluation (Scriven, 1974); meta analysis; responsive evaluation (Stake 1975); and naturalistic evaluation (Guba & Lincoln, 1981). Madaus et al (1983) claim a new dynamic professionalism is available to the new training

initiative that is emerging in our society. Straton (1973) makes the point that evaluation should be done for a number of different interest groups, not only for the provider. He emphasises that people must have available adequate and appropriate information to allow them to make informed judgements and decisions in differing situations. Evaluation studies are concerned with collecting that information. He proposes that

Educational evaluation is the process of delineating, obtaining, and providing information about an educational programme which is of use in... making judgements and decisions related to the programme.

Judgements may encompass relevance, validity, cost effectiveness, growth, clients, processes and a virtually limitless array of factors which can help the curriculum developer in the design and improvement of the course.

All courses should be evaluated if they are to be used again. Formative evaluation entails the formal collection of data about the course so that it can be improved. Curriculum developers are not particularly interested in summative evaluation because that implies that the programme is over and there is nothing further to develop. Formative evaluation of training programmes, however, implies setting up pilot courses, trialling materials, and establishing feedback mechanisms with teachers and students, as well as collecting information about the course in operation.

THE CURRICULUM DEVELOPER

It is commonly believed, at least in commerce and industry and at least some government departments, that curriculum developers need knowledge and experience in the field in which they write courses. There is, however, evidence to the contrary. People who are experts in their field tend to introduce their own biases and not see alternatives as clearly as outsiders might. They omit asking themselves the right questions or researching new directions and new technologies. Furthermore, people who are not trained in educational practice tend to repeat the strategies and structures by which they themselves achieved best when they were learning. Also they tend to see their own knowledge and careers as models for their students.

A curriculum generalist, on the other hand, is trained to ask the right questions of the right people and manage the curriculum process from start to finish. I have referred in this paper to curriculum teams, content experts and technical support as well as curriculum developers. The ideal team must include this range of talents. The content experts might do the content writing, and certainly with large projects this will be necessary. However with smaller projects like the production of module booklets or worksheets, where there may be more design expertise than content, the content expert may be able to tell the curriculum developer all the information needed and save time by leaving the writing to the developer. I have worked both ways. Whoever does the writing, the curriculum developer needs to keep a close eye on the formulation of objectives, the structure and level of the content, the format and the consistency of presentation. He or she controls the process and makes the decisions throughout. The other part of a curriculum team consists of the appropriate

technical staff, typists, graphic designers, photographers, audio and video producers and the generators of all the technological wizardry we have been hearing about at this conference today.

The curriculum developer has to be a good communicator and a good listener. He or she should be even tempered, patient and an efficient organiser. It could wreck the process to fall out with any of the team, to miss deadlines, or to forget to keep the right people informed. The development of open learning strategies requires that these talents be even better developed in the curriculum developer. The development of open learning requires imagination, time for thinking and very good networks.

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 and 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."

EDUCATION THEORY AND PRACTICE

Education Theory and Practice integrates foundational principles with practical applications, providing a comprehensive framework for understanding and enhancing the educational process. Grounded in diverse philosophical perspectives, this book delves into the historical and theoretical underpinnings that shape modern educational practices. It explores prominent learning theories, from behaviorism to constructivism, elucidating their implications for instructional design and classroom management. Central to the text is the concept of curriculum design and development, which involves translating theoretical insights into tangible learning experiences. Readers are guided through the process of crafting curriculum frameworks that align with educational goals and cater to diverse learner needs. Moreover, the book addresses the crucial role of assessment and evaluation in gauging student progress and informing instructional decisions. Drawing on psychological insights, it examines the cognitive and emotional dimensions of learning, shedding light on factors that influence educational outcomes. Education Theory and Practice empowers educators to apply theoretical knowledge in real-world contexts. By fostering a deep understanding of educational theory alongside actionable pedagogical techniques, this book equips readers with the tools to create engaging, effective, and inclusive learning environments. Education Theory and Practice explores the dynamic interplay between pedagogical principles and real-world application, shaping the landscape of learning.



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