Bachelor of Education (B. Ed)
Guru Gobind Singh Indraprastha University, Delhi
Course Title: Teaching of Social Sciences
Course Code: 119 Credits - 4
Time Allotted: 64 Hours
MM: 100 (External 75, Internal 25)

Course Objectives:

The Teaching of Social science would enable the Pupil Teacher to -
1. Develop understanding about the basic differences between Social Studies and Social Science.
2. Understand the need for teaching Social Science as an integrated discipline
3. Develop the ability to justify the Relevance of social Sciences in terms of Contemporary events.
4. Gain knowledge about the different approaches associated with the discipline
5. Develop certain professional skills useful for classroom teaching.

Course Content:

Unit - I: Learning and Teaching Social Studies (08 hours)
- Nature and Scope of Social Science
- Difference between Social Science and Social Studies
- Aims and objectives of teaching Social Sciences
- Social Science curriculum at School level - correlation with other subjects.
- Prevalent text books in Social Sciences. Critical appraisal of a Social Science Text book

Unit - II: Methods and Strategies (30 hours)
- **Approaches / Methods of Teaching Social Sciences**

1. Difference between Approaches, strategies and methods
2. Types of Approaches – Inductive, deductive
3. Methods –

a) Story telling
b) Problem Solving
c) Project Method
d) Observational Method
e) Assignment Method

4. Grouping students for learning

a) Cooperative learning
b) Using structured questions to aid learning
c) Role playing and simulation
5. Qualities of an exemplary social science teacher

Transactional Strategies

1. Preparation of Unit Plan, Lesson Plan using various approaches.
2. Instructional Aids: - Preparation, improvisation and effective use - Chart, Models, Scrap Books, Media (Print Non-print and Electronic Media), Maps, Globe.
3. Social Science Laboratory - organization and management
4. Organization and planning of Co-curricular Activities in Social Science – Field Trip / Excursion / Bulletin Board in Social Studies
5. Dealing with Controversial Issues in Social Studies

Unit - III: Concepts and Technology Integration (18 hours)

- Developing Concept and Generalizations
- Concept formation and classification
- Concept Mapping in Social Science
- Instructional strategies for concept learning
- Technology Integration: Planning with the iNtegrating Technology for inquiry (NTeQ) model for Social Sciences at secondary school level.

UNIT - IV: Evaluating and assessing student learning (08 hours)

- Evaluation: Concept, importance and Types of Evaluation. Concept of Comprehensive and Continuous Evaluation
- Type of Test items and development of achievement test in social sciences.
- Diagnostic testing and remedial measures.

Unit - I: Learning and Teaching Social Studies (08 hours)

Nature and Scope of Social Science
Difference between Social Science and Social Studies
Aims and objectives of teaching Social Sciences
Social Science curriculum at School level - correlation with other subjects.
Prevalent text books in Social Sciences. Critical appraisal of a Social Science Text book

Nature and Scope of Social Science

The word "science" is older than its modern use. The word has become a short-form for "natural science". It is a recent development that society has become the object of an organized body of knowledge which can be standardized and taught objectively, while following its own rules and methodology.

The Social science has a wide scope. The social sciences comprise academic disciplines concerned with the study of the social life of human groups, animals and individuals including anthropology, archeology, communication studies, cultural studies, demography, economics, human geography, history, linguistics, media studies, political science, psychology, social work and sociology.

Mathematics, and study of history, poetry or politics had no difference in the past. With the development of mathematical proof the people perceived the difference between scientific disciplines and others. Aristotle studied poetry and planetary motion at the same time with the same methods, and Plato mixed geometrical proofs with his demonstration on the state of intrinsic knowledge.

The study of social sciences is considered as vital for the future of the society throughout the world and provides many degrees in the respective fields.

The Public Administration, one of the main branches of political science, can be described as the development, implementation and study of branches of government policy. The non-government organizations (NGO's) are working for the betterment of the society throughout the world.

The social sciences are sometimes criticized as being less scientific than the natural sciences in that they are seen as being less rigorous or empirical in their methods. This claim has been made in the so-called science wars and is most commonly made when comparing social sciences to fields such as physics, chemistry or biology in which corroboration of the hypothesis is far more

incisive with regard to data observed from specifically designed experiments. Social sciences can thus be deemed to be largely observational, in that explanations for cause-effect relationships are largely subjective. A limited degree of freedom is available in designing the factor setting for a particular observational study. Social scientists however, argue against such claims by pointing to the use of a rich variety of scientific processes, mathematical proofs, and other methods in their professional literature.

The modern world is making progress by leaps and bounds and the social sciences have its vital role in the development of the world. The following main branches of social science deal with the main issues facing by the modern world.

The human being is surrounded by the unlimited problems and as a human being one needs to solve them desperately.

Social work is concerned with social problems, their causes, their solutions and their human impacts. Social workers work with individuals, families, groups, organizations and communities. Social Work is the profession committed to the pursuit of social justice, to the enhancement of the quality of life, and to the development of the full potential of each individual, group and community in society.

Social work is unique in that it seeks to simultaneously navigate across and within micro and macro systems -in order to sufficiently address and resolve social issues at every level. Social work incorporates and utilizes all of the social sciences as a means to improve the human condition.

Following are the main branches of social sciences that deal with the modern problems of the modern world of 21st century.

Economics is a social science that seeks to analyze and describe the production, distribution, and consumption of wealth. The classic brief definition of economics, set out by Robins in 1932, is "the science which studies human behavior as a relation between scarce means having alternative uses." Without scarcity and alternative uses, there is no economic problem.

Education encompasses teaching and learning specific skills, and also something less tangible but more profound: the imparting of knowledge positive judgment and well-developed wisdom. Education has as one of its fundamental aspects the imparting of culture from generation to generation. It draws on many disciplines such as psychology, philosophy, computer science, linguistics, neuroscience, sociology and anthropology.

Geography as a discipline can be split broadly into two main sub fields: human geography and physical geography. The former focuses largely on the built environment and how space is created, viewed and managed by humans as well as the influence humans have on the space they occupy. The latter examines the natural environment and how the climate, vegetation & life, soil,

water and land form are produced and interact. As a result of the two subfields using different approaches a third field has emerged, which is environmental geography.

History is the continuous, systematic narrative and research of past events as relating to the human species; as well as the study of all events in time, in relation to humanity. History can be seen as the sum total of many things taken together and the spectrum of events occurring in action following in order leading from the past to the present and into the future. The historical method comprises the techniques and guidelines by which historians use primary sources and other evidence to research and then to write history.

Law in common place, means a rule, which (unlike a rule of ethics) is capable of enforcement through institutions. Law is not always enforceable, especially in the international relations context. It has been defined as a "system of rules", as an "interpretive concept" to achieve justice, as an "authority" to mediate people's interests, and even as "the command of a sovereign, backed by the threat of a sanction". However one likes to think of law, it is a completely central social institution. Legal policy incorporates the practical manifestation of thinking from almost every social sciences and humanity.

Linguistics investigates the cognitive and social aspects of human language. The field is divided into areas that focus on aspects of the linguistic signal, such as syntax (the study of the rules that govern the structure of sentences), semantics (the study of meaning), phonetics (the study of speech sounds) and phonology (the study of the abstract sound system of a particular language); however, work in areas like evolutionary linguistics evolutionary linguistics (the study of the origins and evolution of language) and psycholinguistics (the study of psychological factors in human language) cut across these divisions.

Political science is an academic and research disciplines that deals with the theory and practice of politics and the description and analysis of political systems and political behaviour. Fields and subfields of political science include political economy, political theory and philosophy, civics and comparative politics, theory of direct democracy, apolitical governance, participatory direct democracy, national systems, cross- national political analysis, political development, international relations, foreign policy, international law, politics, public administration, administrative behaviour, public law, judicial behaviour, and public policy. Political science also studies power in international relations and the theory of Great powers and Superpowers.

Psychology is academic and applied field involving the study of behaviour and mental processes. Psychology also refers to the application of such knowledge to various spheres of human activity, including problems of individuals' daily lives and the treatment of mental illness.

Sociology is the study of society and human social action. It generally concerns itself with the social rules and processes that bind and separate people not only as individuals, but as members of associations, groups communities and institutions and includes the examination of the organization and development of human social life. The sociological field of interest ranges from

the analysis of short contacts between anonymous individuals on the street to the study of global social process. Most sociologists work in one or more subfields.

There are so many other fields that enhance the scope of social sciences in the century of machines.

Human life is enveloped by social sciences in one shape or other. The man of 21st century is surrounded by unlimited problems; social sciences are the solutions of these problems. Natural science talks about the facts of the universe; it is social sciences that deal with these facts.

Difference between Social Science and Social Studies

Although Social Studies and Social Science sounds similar, both are entirely different streams of study. Social Studies deal with the study of the society as a whole, which encompass current and past events. In contrast, Social Science is branch of Science that is concerned with the study of the communal life, the evolution of human groups and folks, as well as economics, topography, ancient times, political science, psychology, social studies, sociology and so on.

Social Studies courses and career opportunities

Social studies courses reveal the varying nature of knowledge, fostering exclusively innovative and highly incorporated approaches to resolve issues of significance to humanity. There are various subdivisions in Social Studies. Geography, History, Anthropology and Humanities all come under Social Science. Besides the graduate and postgraduate programs in Social Studies, aspirants can pursue the PhD programs in the same in their interesting topics. Aspirants should complete the post graduation in the concerned disciplines to get good employments in the sector. Their career prospects vary according to the area in which they are specialized. On completion of their course, they can expect employments in public or private sector as an Urban Planner, Sociologist, Anthropologist, Social Worker, Historian, and so on.

Social Science courses and career opportunities

Many Universities and institutes in India offer diverse Social Science courses. Both Bachelors' and Masters' programs are available in Social Science. Those who want to become research analysts in Social Science have to pursue the M Phil or PhD courses in the respective fields. Aspirants can specialize in Criminology, Political Science, Linguistics, International relations and so on. After completing the course, they can search out for career in the respective fields in which they are specialized. They can seek out for employments in private or Government agencies.

Key differentiators between Social Studies and Social Science

Social science and Social studies are two terms that are used to indicate two different subjects. Social study is the combined studies of social science and humanities. The objective of the study

of social studies is to promote a healthy citizenry. On the other hand, social science is a subject that deals with the study of social life of people or groups of individuals. This is the main difference between social science and social studies.

Social science includes subjects such as geography, history, economics, psychology, political science, and more importantly sociology. The study of sociology forms a very important part of the subject of social science.

It is important to know that economics is a branch of social science that deals with the production and distribution of goods and services. It is a social science that studies about the supply and demand for particular goods or service. It studies the growth of population and its effect on the supply and distribution of products, goods and services.

Human race and various events connected with the human race along with the study of archeological findings of the past constitute another important branch of social science called as history. The theory and practice of politics is covered by the subject of political science, which is one of the most important social sciences. Geography for that matter consists in the study of the planet Earth and its inhabitants. It is an important social science that throws enormous light on factor such as climatic conditions, temperature, earthquakes and other natural phenomena.

The accomplishment of civic prominence is the chief objective of social studies. It is important to note that social studies is first taught at the primary level in schools. The study of social studies is primary centered on the aspects of human society. The various discussions connected with social studies are mostly opinion-led discussions. On the other hand, the discussions connected with social sciences need not be opinion-led discussions. This is one of the chief differences between social science and social studies.

As a matter of fact, social studies should never be considered as synonymous with social sciences. This is due to the fact that social studies varies greatly between countries and set ups. Social studies pertaining to one country may not concur with the social studies pertaining to another country. These are the differences between social science and social studies.

Social Studies are the study of all phases of societies whereas Social Science is the inference of those studies with the intention of solving problems within a society, which may lead to the ultimate development of the society as a whole.

- Social Studies is the incorporated study of Social Science and humanities to endorse efficient citizenry.
- Even if Social Studies and Social Science are poles apart, both these subject collectively help to make improvements and advancements in the society.

Aims and objectives of teaching of Social Sciences

Studies in this field to explain the importance of understanding the norms of social life and regulations must be established and the social roles that need to be strengthened. Through this area recognizes the importance of the individual to interact effectively to create a responsible society, harmonious, united, democratic, progressive, and always thankful for God's blessings.

Knowledge in the discipline of geography will strengthen the understanding of the existence of human and environmental interactions and understanding how we need to maintain and preserve the well being and maintain their sustainability for future generations.

Patriotism and love of country must be cultivated and nurtured in the soul of every citizen. Knowledge of the history of statehood will be able to build and develop a strong identity. It is appropriate for students exposed to the basic theory of political science to see the connection with the current political system.

In creating a stable life, people need to carry out economic activities based on our limited resources and technologies that are always competitive. In this connection should be studied on the efficiency of managing resources to meet human needs and interests are not limited. Various types of economic systems and the role of government in addressing economic problems for social stability can be achieved is disclosed to the student. To create awareness of regional cooperation in the economic and environmental care will strengthen the importance of positive interaction among people as members of society at all levels.

The course also provides opportunities for students to link theory with contemporary issues that arise and the interaction of society and suggest some solution.

GOAL

Social Studies Curriculum of the preparatory course aims to provide an understanding of the development of community life in the context of time, space, economic, and political will to establish social harmony, progress, and have a rational thought in decision-making. This is done through a balanced interaction with the community and the environment to the well-being, national, and world.

OBJECTIVE

Social Studies Curriculum is designed to enable students to:

- linking the disciplines of Social Studies of everyday life of individuals and communities;
- enhance understanding of the social system through the culture and values to create a multi-ethnic society of national integration;
- linking the country with a history of nation building;
- environmental incidents relating to the social and economic development of society;

- explain basic economic principles and economic activities associated with social development and nation building;
- applying knowledge of environmental education in the life and
- cultivate a spirit of patriotism.

Social Science curriculum at School level - correlation with other subjects.

First, you must understand the content of the social studies at a level appropriate to that which you intend to teach. To understand content means more than mere memorization of facts. To understand content for a teacher means that you can explain it in more than one way to others, whether the content concerns facts, generalizations, principles, themes, and so on. To put it bluntly, you do not understand subject matter content unless you understand it in more than one way. For example, if your understanding of the causes of the American Revolution is limited to catch-phrases such as "taxation without representation," and the Intolerable Acts, you do not understand the causes in sufficient depth to explain them to others. So, the first concept involved in becoming a good social studies teacher is that you understand in more than one way the content of what you are to teach. You arrive at this level by reading, thinking, reflecting, and yes, teaching. Also, after many years of reflection, it is obvious that the very best social studies teachers have an insatiable appetite for their subject area; they read a lot, they are wonderfully curious about how our social fabric came to be and how our values and institutions shape our world. There is no other way to put it.

Second, you must be able to translate the content you so understand to make it learnable, interesting, and challenging for students at the age and grade level you are teaching. It requires rearranging what you know. This applies to social studies more than any other content area simply because social studies as a discipline lacks any widely agreed-upon structure. For example, you may thoroughly understand the events, chronology, and causes of World War II. You may have taken one or more courses at the college level that dealt with World War II, and you may also have independently read several books about the war. This does not mean that what you "know" is in a form that a typical 4th, 8th, or 11th grader can readily understand. You will need to look at the specific curriculum you are supposed to implement and integrate what you know with the objectives or what is intended students learn. The tyranny of "following the book" has historically produced several generations of students who have at best a poor understanding of social studies.

Third, you must consider pedagogy.

This means that you not only understand the content in more than one way, can translate it into a form understandable, learnable, challenging, and interesting to your students, but that you also have the skills to actually teach the content. Pedagogy without subject matter content isn't worth very much. Simply "knowing about" teaching methods won't do. There is probably no more important skill required in teaching social studies than the ability to explain events, ideas,

principles, and social interrelationships. In some ways, good social studies teaching rests on the ability to tell stories well. For social studies, this story telling ability is grounded in the depth and awareness of the connective possibilities of the content. Helping students make new connections, to find challenge and meaning in social studies content is what excellent social studies teachers do every day. They are able to do it because they understand in more than one way what they are teaching and are able to draw upon this knowledge to make any lesson an adventure for their students. They adjust the content in a myriad of ways as the situation requires. They are never stuck, never at a loss to show or tell students something new, different, or interesting about what they are learning. For these fortunate teachers, teaching social studies is a true joy. It was at the very least for me one of the most satisfying periods of my career as a teacher.

Prevalent text books in Social Sciences. Critical appraisal of a Social Science Text book

There are so many books on this subject but it is very difficult to confine social science in one book because there are so many aspects of social science e.g. are social science art or science?Social science refers to the academic disciplines concerned with the society and the relationships of individuals within a society, which primarily rely on empirical approaches. It is commonly used as an umbrella term to refer to anthropology, economics, psychology and sociology. In a wider sense, it may often include humanities such as archaeology, area studies, communication studies, cultural studies, folkloristics, history, law, linguistics, political science, and rhetoric. The term may however be used in the specific context of referring to the original science of society, established in 19th century, sociology (Latin: socius, "companion"; Greek λόγος, lógos, "word", "knowledge", "study."). Émile Durkheim, Karl Marx and Max Weber are typically cited as the principal architects of modern social science by this definition.
Positivist social scientists use methods resembling those of the natural sciences as tools for understanding society, and so define science in its stricter modern sense. Interpretivist social scientists, by contrast, may use social critique or symbolic interpretation rather than constructing empirically falsifiable theories, and thus treat science in its broader sense. In modern academic practice, researchers are often eclectic, using multiple methodologies (for instance, by combining the quantitative and qualitative techniques). The term social research has also acquired a degree of autonomy as practitioners from various disciplines share in its aims and methods.
In last, I will deal suggested readings for whole syllabus.

Unit - II: Methods and Strategies (30 hours)

Approaches / Methods of Teaching Social Sciences

1. Difference between Approaches, strategies and methods
2. Types of Approaches – Inductive, deductive

3. Methods –
a) Story telling
b) Problem Solving
c) Project Method
d) Observational Method
e) Assignment Method

4. Grouping students for learning
a) Cooperative learning
b) Using structured questions to aid learning
c) Role playing and simulation

5. Qualities of an exemplary social science teacher

Difference between Approaches, strategies and methods

In the context of learning, we would be familiar with the terms of approaches, strategies, methods, techniques, and learning models. But many of the students education (prospective teachers) and even the teachers who do not understand in depth so it can not explain what exactly the similarities and differences of these terms. Most of them understand each of those terms. Others think differently to these terms, but not able to explain how the difference. In what follows, I attempt to explain the difference between learning approaches, learning strategies, learning methods: learning techniques, and learning models. Each of these terms can be explained as follows:

Learning approach is the way teachers view the learning process, in which there are learning strategies with all his theories. Learning approaches can be divided into two approaches are student-centered learning (student centered approach) and learning-centered approach the teacher (teacher centered approach). Of the two learning approaches are then lowered into the learning strategies.

Learning strategy is a teacher of learning activities undertaken with the aim of the learning process that takes place in the classroom can achieve (goals) to effectively and efficiently. Inside there is a learning strategy-planning planning created teachers. In principle, the learning strategy of conceptual plans that will decisions be taken in the learning process. Viewed from the side of the strategy, can be grouped into two general categories: exposition-discovery and group learning, individual learning. Meanwhile, in terms of how the presentation and the way of processing, can be divided into two learning strategies are the inductive and deductive learning strategies. Learning strategy is still conceptual, necessary for the implementation of certain teaching methods.

Method can be considered as a way of learning that must be taken to realize the plan that has been a teacher in a real and practical activities in the classroom to achieve learning objectives. Thus, the strategy is "a plan for Achieving Goals" while the method is "a way for Achieving Goals". There are many methods of learning that can be used to achieve these learning strategies include: (1) lecture, (2) demonstration, (3) discussion, (4) simulation, (5) laboratory, (6) field experience, (7) brainstorming; (8) debates, (9) symposium, and so forth. Meanwhile, there are techniques in the teaching methods of learning.

Learning techniques is the way in which the teacher in carrying out the method of learning. As an illustration, the application of the method of role playing in class that students have parents with higher average economies, different treatment techniques for parents of students with low average economy. Also the application of methods for a class belonging to the debate on, need to use different techniques than the class of passive students. A teacher can alternate while learning techniques within the framework of the same learning methods.

Learning model is a frame from the application of an approach, strategy, methods, and techniques of learning. Learning model is a series of strategies, methods, and techniques of learning in a single unified whole. Thus, the learning model is basically a form of learning which is reflected from start to finish is typically presented by the teacher.

According to Arends (1997), learning model implies something greater than the strategies, methods, or steps. Learning model includes the approach, the whole area of learning. For example, problem-based teaching model (problem-based instruction) involving small groups of students working together to solve problems of mutual interest to the group. In this model, students use a variety of thinking skills of problem solving and critical measures. Thus, one model of learning to use a number of methodological or procedural skills such as defining problems, ask questions, conduct research, discussion and debate found the findings, work together, creating a masterpiece, and presentations. Learning model has four attributes of a strategy or a typical procedure (Arends, 1997):

1. A coherent theoretical rationale
2. Aimed at learning outcomes
3. Required to teach behavior
4. Required class structure

Arends (1997) also menyatakah that learning models are classified based on learning goals, their syntax (sequential patterns), and the nature of their learning environment. Typical use of the model allows teachers to achieve some learning objectives. Models of teaching (direct instruction) for example, is a good method to help students learn basic skills such as multiplication tables or geography. However, it is not suitable for teaching math concepts a higher level or to help students understand the influence of Earth's topography on agricultural production.

The syntax of the model of the stages of learning is a reference to the overall plot or sequence of steps in the learning process. The syntax of the lesson to determine what types of activities the teacher and student activities are required, the sequence of actions taken, and the specific tasks given to students. The syntax of the learning model has certain things the same. For example,

almost all the commands starting with getting students' attention and get them motivated to engage in learning activities. Similarly, most models use some form of closure measures which teachers and students summarize or review what they have learned. The syntax of the model arealso learning there is a difference. Sequence of learning activities in teaching (direct instruction) for example, is much different than in the lesson group discussion (group discussion lesson).

Each model involves perberbedaan learning environment and management system. Each approach places different demands on students, the physical space, and the social class system. Cooperative learning (cooperative learning), for example, requires a flexible physical environment that includes features such as moveable tables. The discussion is usually done when the students sit in a circle or horseshoe arrangement. In contrast, in the direct teaching (direct instruction) works well if the students sit in rows facing the teacher. Similarly, different teaching approaches make different demands on the student assignment, and this requires a particular management strategy. In direct instruction, it is important for students to be quiet and pay attention to what is said and done by the teacher. However, during cooperative learning, critical precisely when students talk to each other.

However there is no single model of learning is better than the other. Classroom teachers need a repertoire of practical teaching in order to meet the diverse objectives and circumstances that characterize today's schools. Approaches or methods are no longer enough. With a repertoire that is enough, the teacher can choose the best model to achieve a particular goal or the most appropriate to the situation or particular student groups. Also, alternative models can sometimes be used together. For example, teachers can use direct instruction to each new subject or skill, followed by class discussion to broaden students' thinking about one topic. And then divide the students into cooperative learning groups to practice newly acquired skills and to build their own interpretation of the subject.

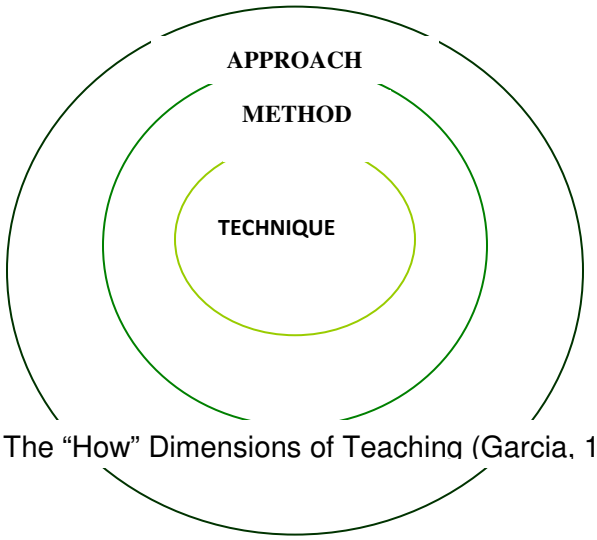
In the context of learning, so that teachers can perform their duties professionally, then teachers need to understand and possess adequate skills in developing various models of effective learning, creative and fun, as hinted in the Education Unit Level Curriculum. Basically creative teachers can try out and develop a distinctive learning model, in accordance with actual conditions in their respective workplaces, so that in turn will appear models of learning version of the teacher in question, which of course will further enrich the learning model that has been no. Model of learning from teachers in one school may differ from the model of learning from teachers in other schools even though the perception of the same approaches and methods. Therefore, teachers need to master and apply specific learning model in which there are approaches, strategies, methods, and techniques of learning.

- discuss the nature and features of the different teaching approaches, and
- discern what makes a good method and eventually, evaluate whether the methods employed by the teachers are good

2. Presentation

Approach, Method and Technique Defined

The simple diagram found below is an attempt to distinguish them:



The "How" Dimensions of Teaching (Garcia, 1989)

Based on the diagram, it clearly shows that approach encompasses the whole orientation of teaching. Approach is the broadest of the three, making technique the most specific, and the method found in between approach and technique.

An approach is an enlightened viewpoint toward teaching. It provides philosophy to the whole process of instruction. As presented by the diagram, the method and technique are just parts and parcels of approach. Approach gives the overall wisdom, it provides direction, and sets expectations to the entire spectrum of the teaching process. Furthermore, approach sets the general rule or general principle to make learning possible.

A method, on the other hand, is an organized, orderly, systematic, and well-planned procedure aimed at facilitating and enhancing students' learning. It is undertaken according to some rule, which is usually psychological in nature. That is, it considers primarily the abilities, needs, and interests of the learners. Method is employed to achieve certain specific aims of instruction. To make it as an effective instrument, it should be presented with certain amount of efficiency and

ease. More so, the teaching method aims to achieve greater teaching and learning output, thus saving time, efforts and even money on the part of both the teacher and the learner. It directs and guides the teacher and the students in undertaking any class lesson or activity.
To appraise that teaching method is good and effective, the following characteristics would tell if it is so:

- ✓ good method recognizes individual differences;
- ✓ if it provides students' learning;
- ✓ if it facilitates growth and development;
- ✓ if it achieves the desired results of the teacher as reflected in her instructional objectives.

One must remember that there is no such thing as the best method. Thus, there is no single correct way to teach a class. Instead, there are many good ways of teaching the students.

The procedural variation of a method calls for the third term, technique. Technique encompasses the personal style of the teacher in carrying out specific steps of the teaching process. Through technique, teachers enable to develop, create and implement, using her distinctive way, the procedures (method) of teaching.

Teaching Strategy

In due time, educators and writers started using the term teaching strategy with reference to the methods and procedures utilized in teaching.
The term strategy is derived from the Greek word "strategos", literally translated as " the art of the general". As a military term, it appeared in the literature in the latter part of the 18th century, referring to the larger aspects of conducting war. In the context, it was defined as " the efficient application of resources to the accomplishment of objectives", primarily the defeat of the enemy's armed forces. While the larger aspects of conducting war were called strategies, smaller movements were referred to as tactics (Levis, 1985).
It was in the writing of American theorists and researchers such as B.O Smith and Hilda Taba where the notion of a teaching strategy first appeared. But it was Willard B. Spalding who used the term strategy earlier when, in 1958, he stated that the curriculum is the strategy by which the schools attempt to fulfill the goals of education. Referring to strategy – as applied to curriculum- as a sound calculation and coordination of the means and ends, Spalding pointed out.
In a paper entitled " Toward a Theory of Instruction" Smith (1963) defined teaching as a "system of actions intended to induce learning", and strategy as " a pattern of acts that serves to obtain certain outcomes and to guard against certain others". It is obvious that Smith was adapting military concepts to a classroom setting.
Another theorist, Taba (1969) also focused attention on the concept of teaching strategy. In her view, it was useless to study teaching as a global process; rather, it was necessary to identify

particular teaching strategies required for particular types of instructional objectives. The main aim of strategies, she proposed, was the development of children's thinking skills.

Aber et.al (1971) defined teaching strategy as : teaching strategy is a purposefully conceived and determined plan of action. Ideally, the strategy is designed to facilitate a particular kind of learning in a given situation and in terms of a specific learning objective. The strategy is selected for use after a comprehensive assessment of the specific situation prior to the actual instructional art. The operations of assessing the situation and selecting the strategy represent the "professional expertise" that the teacher brings to the instructional setting.

Another definition of teaching strategy was given by McClosky (1971): teaching strategy is a teaching approach that is used either in solving a classroom problem or in improving instruction.

According to Frankael (1973), teaching strategies represent the combinations of specific procedures or operations, grouped and ordered in definite sequence that teachers can use in the classroom to implement both cognitive and affective objectives.

SOME LEADING TEACHING APPROACHES

A. DISCOVERY APPROACH
B. CONCEPTUAL
C. PROCESS
D. INQUIRY
E. UNIFIED

DISCOVERY APPROACH

This approach pertains basically to cognitive aspect of learning; the development and organizations of concepts, ideas and insights, and the use of reference and other logical processes to control a situation.

Characteristics:

1. It is inductive, proceeding from the specific to general ones.
2. Freedom is necessary in the discovery approach.
3. The teacher helps the learners acquire knowledge, which is uniquely his own because he discovers it for himself.
4. The end of teaching, using this approach, is the acquisition of knowledge.
5. The students and not the teacher should be actively involved in the process of discovery
6. The students look at the knowledge that they have discovered as something new to them.

Centering on a series of problem solving situations, the discovery approach, therefore, calls for active student involvement. It is student-centered as well as self-directed learning.

Roles of the Teacher

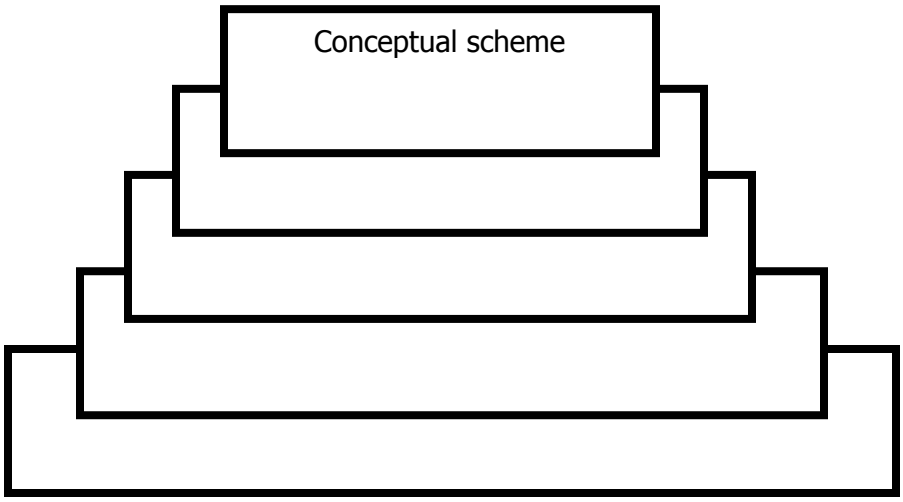
1. Patience is needed in this approach. He does not pressure his students but he gives them enough time to formulate the expected generalization.
2. The teacher should not answer for the students; he can give clues and hints instead. He does not generalize for them.

Advantages

1. The increase in intellectual potency
2. The shift from extrinsic to intrinsic motivation
3. The learning of the heuristics of discovery (how to learn)
4. The aid to conserving memory

CONCEPTUAL APPROACH

This approach requires the categorization of content from simple to complex level. Students need not go into an actual investigation or experimentation, which is usually required in discovery approach. A simple act of recalling facts will suffice like asking students to state certain phenomena that they observe.
This approach recognizes the HIERARCHY OF COGNITION below:



Hierarchy of Cognition (Focus on Teaching, 1989)

Roles of the Teacher

1. The teacher using conceptual approach should be able to master the cognitive hierarchy of discipline. He should be able to categorize all knowledge pertinent to his area; from facts to concepts; from concepts to generalizations; from generalizations to principles; and all of these should be organized around conceptual schemes which are pervasive ideas embodying the whole discipline.
2. The teacher should help students to gather sufficient data to enable them form the expected generalization.
3. The teacher should not conceptualize for his students. The students should conceptualize for themselves.

Advantages

1. Since conceptualization as process involves an active use of mind, certain intellectual processes are being developed like classification, discrimination, synthesis, and judgment. While knowledge is being processed, students have to think logically and holistically.
2. One value of the students' ability to generalize is that they can make use of the insights gained in certain problematic situations.
3. They could see and realize that bits of information, which seem to be isolated can be organized and pierced together like a jigsaw puzzle around a context in the broader fundamental structure of a field of knowledge. Thus, they become aware that every time the teacher presents a set of facts, the lesson is to be approached in its totality. Thus, meaning is drawn out and derived from it.

PROCESS APPROACH

The process approach may be defined as teaching in which knowledge is used as a means to develop students' learning skills.
This approach originated from and used to be a monopoly of science instruction. Today, it is identified primarily with skill-oriented subjects like practical arts and home economics and even with knowledge-laden subjects like social studies.
The essence of the process approach lies on three major points:

1. emphasis on process implies a corresponding de-emphasis on the subject content (the concern is how to learn and not what to learn).
2. it centers upon the idea that what is taught to students should be functional and not theoretical (e.g. if you learn mathematics do what mathematicians do; if you learn science, do what scientists do; and if you learn music, do what musicians do)
3. it introduces the consideration of human intellectual development (produces the consideration of human intellectual development – processes may refer to intellectual skills).

Advantages

1. Teaching a man how to catch fish is must better than giving him fish every time he needs it – this is the adage recognized by process approach.
2. By developing the skills of the students, the teacher is preparing him to be independent, self-sufficient, and productive person. This gives substance to education as a process of "preparing one for his own life".

INQUIRY APPROACH

The concept of inquiry refers to one's attempt to understand fundamental issues and concerns that may affect one's status in life. From the point of view of teaching and learning, the concept of inquiry gives premium to the process of discovering what may be of help in motivating and in facilitating proper accumulation of knowledge.

Characteristics:

Its emphasis is placed upon the aspects of search rather than on the mere acquisition of knowledge. It addresses itself primarily to learning concepts, although an end product of any inquiry lessons may be production of a new idea of concept – or a new invention. It is the search for truth, information or knowledge. It pertains to research and investigation and to seeking for information by asking questions.

This approach views a given discipline more as an attitude than as a body of knowledge or as a method. Emphasizing the affective aspects of learning, it uses both the content and processes as means toward the development of the qualities of the mind as curiosity, skepticism, intellectual honesty and the like.
In using this approach, the questions should proceed from the very factual to thought-provoking questions – that is from the **what** questions to the **how** and **why** questions. More opportunities should be provided to students to respond to questions that call for analysis, interpretation, evaluation, and judgment.

The inquiry approach simply calls for the use of systematic method of studying a problem so that solutions therefore be equally prepared and implemented.

Role of the teacher:

In the classroom, the teacher should be an active participant in bringing about working relationship among learners, which enhances functional interplay of ideas and actions. Teachers and learners alike should learn to make adjustments in undertaking activities geared towards the "greatest good for the greatest number".

This approach encourages teacher to be open-minded, and to be gracious in accepting criticisms and challenges with an end in view of insuring the carrying out of school activities as planned.

ADVANTAGES:

1. it requires them to go beyond the knowledge and skills levels of learning toward the affective dimensions like their attitudes, values, appreciations and the like.
2. They are expected to become more analytical and less gullible.
3. When students have adopted the spirit of inquiry, they become more curious and observant individuals.

The inquiry approach figuratively vibrates a nugget of wisdom:"In work, every day brings new changes for one to grow, new challenges to meet, and new mission to pursue. If systematically planned, every new day is a step towards one's pleasant dream".

UNIFIED APPROACH

Teachers by and large present knowledge in its isolated and fragmented bits, as if each bit is an independent entity by itself. Once presented to students, these unrelated bits of information seem to be likely unattractive and meaningless to them. They might be able to memorize them for sometime but there is no guarantee that they will retain them. Their tendency is to recite them by rote, especially when there is an examination scheduled in a day's time or two.But after the test is given, such bits are surely relegated to oblivion.
The unified approach is defined as means of treating relationships that exist among the significant components making up a given body of knowledge. It is a thorough process of weaving and integrating topics into a general framework or a conceptual scheme. This simply means that the teacher does not treat each concept as an island by itself but rather he relates the previously learned concept with the new concept, until finally the students are able to see the interrelationships among the various concepts that serve as the mainstays or as the cognitive pillars of an academic subject. Its primary aim is to enhance the student's learning by making him view things in their entirety or totality.

CHARACTERISTICS:

1. it is highly cognitive
2. it leads students toward insightful and meaningful learning
(concepts on comparison, linking up, ascertaining the cause and effect, determining prerequisites, predicting results, synthesis)
3. it is holistic in treatment

Types of Approaches – Inductive, deductive

Inductive and Deductive Instruction

Two very distinct and opposing instructional approaches are inductive and deductive. Both approaches can offer certain advantages, but the biggest difference is the role of the teacher. In a deductive classroom, the teacher conducts lessons by introducing and explaining concepts to students, and then expecting students to complete tasks to practice the concepts; this approach is very teacher-centred. Conversely, inductive instruction is a much more student-centred approach and makes use of a strategy known as 'noticing'. Let's take a closer look at the differences between inductive and deductive instruction, and find out how noticing can be used in the language classroom to better facilitate student learning.

What is deductive instruction?

A deductive approach to instruction is a more teacher-centered approach. This means that the teacher gives the students a new concept, explains it, and then has the students practice using the concept. For example, when teaching a new grammar concept, the teacher will introduce the concept, explain the rules related to its use, and finally the students will practice using the concept in a variety of different ways.

According to Bob Adamson, "The deductive method is often criticized because: a) it teaches grammar in an isolated way; b) little attention is paid to meaning; c) practice is often mechanical." This method can, however, be a viable option in certain situations; for example, when dealing with highly motivated students, teaching a particularly difficult concept, or for preparing students to write exams.

What is inductive instruction?

In contrast with the deductive method, inductive instruction makes use of student "noticing". Instead of explaining a given concept and following this explanation with examples, the teacher presents students with many examples showing how the concept is used. The intent is for students to "notice", by way of the examples, how the concept works.

Using the grammar situation from above, the teacher would present the students with a variety of examples for a given concept without giving any preamble about how the concept is used. As students see how the concept is used, it is hoped that they will notice how the concept is to be

used and determine the grammar rule. As a conclusion to the activity, the teacher can ask the students to explain the grammar rule as a final check that they understand the concept.

How can teachers help their students practice 'noticing'?

In the 1990s researchers explored the role that 'noticing' a grammatical construct played in learning that structure. They hypothesized that learners needed to notice a structure in order to hold it in their short- or long-term memory. Although the value of the concept to grammatical acquisition is still under debate (See http://www-writing.berkeley.edu/TESL-EJ/ej23/a2.html), the overall value of responding promptly to questions and observations of learners cannot be dismissed nor can the role that awareness and consciousness play in the development of metalinguistic knowledge.

What is noticing?

Noticing is the process of students becoming aware of something in particular; as mentioned above in the inductive approach, noticing can be used to teach a grammar concept when students are given the examples, and they come to understand the rule by noticing what those examples have in common. In a more general classroom situation, noticing can be used in many ways:

- When teachers speak at a more advanced level, they are giving the students constant opportunities to notice the differences between the teacher's speech and theirs. This way each student can become aware of the differences at his own pace.
- Teachers can provide students with opportunities for noticing simply by putting posters up in the classroom in the target language. As before, when the students are ready to notice the difference, they will.
- Language ladders (see the Functions of Language page) are also to promote students' noticing skills. Once they understand what each rung on the ladder means, they can understand how they all fit together and how they differ.

How can a teacher decide which method is the best choice for a given topic?

Both deductive and inductive sequences are valuable for teaching concepts, generalizations, processes, and skills. The teacher must decide which to select given the learning outcomes desired and the composition of the class. When choosing, the teacher should consider a number of factors:

- How personalized should the learning be? Students will usually be more involved in the learning experience and tend to participate more actively when an inductive approach is used. If a deductive approach is chosen, it is important to structure the learning

experience in order to draw on students' prior experiences and learning, and to provide for their active involvement.

- Should learning experiences be predictable? The deductive approach is more predictable because the teacher selects the information and the sequence of presentation.
- What depth of understanding and rate of retention is desired? Students tend to understand and remember more when learning occurs inductively.
- How much time is available to teach the material? The deductive approach is faster and can be an efficient way to teach large numbers of facts and concrete concepts.

Instructional methods tend to be either deductive or inductive, although some methods use both. Many lessons can include both approaches.

Methods –
a) Story telling
b) Problem Solving
c) Project Method
d) Observational Method
e) Assignment Method

THE STORY TELLING METHOD OF TEACHING IN PRIMARY SCHOOLS

Children love stories,they make interesting images in the minds when listening to a story. Teaching by storytelling is one of the best method of teaching ,the teacher can employ in any lesson presentation.
Oxford Dictionary defines," A story is a narrative of real or fictional events told inorder to amuse interests or illustrates something." A Story is therefore the action of narrating real or fictious.
The historical development of story telling dates back to the times when the societies began. Leaders of smallest social institutions,the family , such as parents,grandparents or other outspoken community members were always regarded as proficient good story tellers. The stories contributed to the moulding of children's charaters as stories carried many social values.
The teacher and primary school teacher in particular has assumed this important role of story telling. Since primary education is more concerned with teaching of moral values story telling becomes a very important method of teaching. Traditional folk stories ,therefore have great significance in the system of modern education.
The qualities of a good story according to Jacinta and Regina(1980)should have good morals were good behaviour is rewarded and evil deeds is punished and should be short precise to the point and not complicated to the children's cognitive conscience. Avoid stories with too many characters and too much dialogue , but should be dramatic and create much excitement. Weird

stories which may frighten children should be avoided at all costs to promote a conducive learning environment.

A good story teller should have qualities that are abilities to use gestures,facial expressions,make use of the language that suits the cognitive level of the learners and to use appropriate aids ,like pictures ,audio-visual to motivate pupils.

Moreover the story teller 's appearance should not attract more attention than the story being told. The story teller must speak fluently,using a clear voice tone and the expressions must be changed spontaneously to suits the moods of the story.

When using the story in a lesson,the teacher can use story telling in an introduction and should be very short. In social and moral lessons story telling is best appropriate for use in the book stage of the child book child approach. It is necessary for the teacher to be observant of learners' reactions so as to take necessary measures.

Story telling has more benefits as an effective method of instruction,because it involves many mediums of communication for example use of gestures,song and dance. It also moulds characters and provides enjoyment. Stories broaden the knowledge of the children and the cultural beliefs and activites. It also establishes good relationships among pupils and their teacher.

Story telling has also negative impacts as it can disadvantages learners ,if the story teller doesn't have the required skills.Extensively use of the story telling method tends to produce passive listeners who receive information without much probing questioning to understand much better. It is also the poor method of active participation by learners as it lessens the opportunity for them to learn by doing.

Problem Solving as Teaching Method

MANY curriculum theories for elementary as well as secondary education exempUfy a primacy of method within the proposed school program. This method usually consists of some form of problem solving procedure as the basis for
most, if not all, teaching-learning activities.

The purpose of this article is threefold:

(a) to describe the source of problem solving as a teaching method;
(b) to explore some of the significant contributions of this teaching method to education; and
(c) to raise some questions concerning the applications or limitations of this
method in organizing learning activities throughout the curriculum.

Dewey's Analysis

In the famous hook, flow We Think, Dewey wrote that learning is learning to think. Although Dewey recognized the existence of many ways of thinking, he insisted, "The better way of thinking is reflective thinking."' This reflective thinking, according to Dewey, involved a process

of translation "from a situation in which there is experienced obscurity, doubt, conflict, disturbance of some sort into a situation that is clear, coherent, settled, harmonious."

Dewey made a logical analysis of this concept of reflective thought by describing five phases that he considered essential functions of this particular mental process. However, he drew cautions about interpreting these phases as discrete steps following each other in a set order.' Furthermore, contrary to some popular journalistic interpretations of Dewey, he considered intellectual curiosity and perserverance the most important attitudes to be formed by learners. Along with reflective thought, "the desire to go on learning" was central to Dewey's concept of are educational experience.' It is difficult to understand whether Dewey intended his logical analysis of reflective thought to become the Titan of method that exists in many curriculum proposals today.

A study by A. S. Luchins indicated that students taught to follow a particular method or procedure were actually being taught not to think in their problem solving. The students in the experiment usually applied the same procedure when given a different type of problem. Furthermore, giving these students instructions to generalize a method of solution had a tendency to increase their "set" or inflexibility toward attacking and solving problems."

An experiment by Schroeder and Rotter demonstrated that students who worked on a variety of problems where no single attack was successful learned to be flexible. On the other hand, those students who had continued success withone method used it rigidly even where it was incorrect.

To think of problem solving as a general method may be a mistake insofar as the learners themselves are concerned. In an article summarizing recent research on problem solving as classroom teaching method, Gross and McDonald state:

When the focus of interest in investigation has been on the general methodology of the problem solver, it has been consistently found that the subjects tend to use a variety of general methodologies."

PROJECT METHOD

Introduction

W. H. Kilpatrick was published a paper on 'The Project Method' in 1918. He was a chief proponent of this method. He mainly focuses on the purposeful activity and problem solving capacity of the students based on their needs, interest, attitudes and abilities. He was influenced by the John Dewey's Pragmatism principle.

The term project is no longer reserved for the planned undertaking calling for the constructive thought and action. Project means almost any undertaking. It is activity oriented buy it is more than the simple activity. It advocates of this the education should be related to the life situation. It the experience centered teaching activity. The main focus of this strategy is socializing the child and developing the problem solving ability.

Definition

- A project is a whole-hearted purposeful activity proceeding in a social environment – W. H. Kilpatrick.
- A problem is a problematic act carried to completion in its natural selection – R. L. Stevenson.
- Project is a voluntarily undertaking which involves constructive effort or thought and eventuates into objective results – Thomas and Lang.

Types

According to Kilpatrick there are four types of projects. They are:

1. Constructive project:
Practical or physical tasks such as construction of article, making a model, digging the well and playing drama are done in this type of projects.

2. Aesthetic project:
Appreciation powers of the students are developed in this type of project through the musical programmes, beautification of something, appreciation of poems and so on.

3. Problematic project:
In this type of project develops the problem solving capacity of the students through their experiences. It is based on the cognitive domain.

4. Drill project:
It is for the mastery of the skill and knowledge of the students. It increases the work efficacy and capacity of the students.

Other types

Individual and Social (Group) projects:
In individual project every students solve the problem in their own according to their interest, capacity, attitude and needs. It develops the problem solving qualities individually and not the social qualities. In the other hand Group projects the problem is solved by the group of pupil in the class. Here the social, citizenship qualities and synergism are develops.

Simple and Complex project:
In the simple projects the students are completing only one work at a time. They are also focus the work in the one subject or one area only. It gives the deep information about the project in a one angle. The students get deeper knowledge about the problem deeper and broader.

In the complex project the students are carried out more than one work at a time. They are focuses on the work in various subject and angles. Here the students get the knowledge about the work in various activities and dimensions.

Principles

1. Principle of Purposefulness

The project should be purposeful, and that should have some main objective. The objective should give the enthusiasm and work to the students, otherwise that will be a wastage of time and energy.

2. Principle of Utility

The project should be useful to the students and the society. It will give some value to the students. From the good project the students as well as the society get the benefit a lot.

3. Principle of Freedom

The students are free to select the topic and execute the work according to their well and wish, interest, attitude and capacity. The teacher just a guide and give a guidelines to execute that.

4. Principle of Activity

Project means the purposeful activity, at the end of the project the students gain knowledge through their activity. It is based on the principle of learning by doing.

5. Principle of Reality

Project should be real and related to the life situation of the students and the society. Only then they would be able to complete the project naturally and really. Imaginary problems are not taken up in the project.

6. Principle of Social Development

A good project focuses society needs, social development, and usefulness to the society. A single project solves the problem of the thousands of the people or the society.

7. Principle of Planning

The student develops prior planning in advance about the project. They find solutions for - How? When? What? Where? Why? So, good project develops the problem solving capacity and prior planning for the execution.

Steps

Project method has the following steps:

1. Creating Situation

In the first step teacher creates the proper situation to the students in the class. He puts up the knowledge about the project method procedure, steps, and uses to the students. After that he should give the proper motivation through conversation about the day to day life problems to the students.

2. Selection of the problem

Then the teacher helps the students to select the problem and guide them. Here the students are having freedom to choose the topic or problem based on their interest and ability. Before choosing the topic the principles should be taken in to an account.

3. Planning

The teacher discuss with the students about the problem in various angles and points. He should create the situation to the discussion with the students and they are allowed to talk freely and openly. After the free expression of the students' opinion about the problem, the teacher writes down the whole programme of action stepwise on the blackboard. The grouping is made by the teacher based on the interest and ability of the students.

4. Execution

The students are stating their work in this step. They are collecting the relevant information/data and materials at first. The teacher should give the time and right to the students according to their own speed, interest and ability. If need arises, he will provide the necessary help and guidelines to the students. He demands the groups to complete the project in the particular time.

5. Evaluation

Here the students evaluating their task. They determine whether the objects are achieved or not. After that they criticize and express their feeling about the task freely. They report the planning, selecting the task, execution and the entire thing are discussed in the class. The entire things are collectively reported to the teacher.

6. Reporting and Recording

It is the last step of the project method in which each and every step of the work are reported. The reported things are recorded in a certain order in a book form. The record is useful

for the further use and future reference about the project. It reveals many ideas about the concern project. The book formatted report is submitted to the teacher at the end.

Advantages

- It is students centered, activity based method.
- Students involves whole-heartedly in the learning process according to their needs, attitude, interest and ability.
- This method is related to the life situation of the students.
- This method develops the problem solving ability to the students.
- It makes the students as independent.
- It gives the real work experience to the students.
- It develops the social qualities and synergism in the students' heart.
- It develops the responsibility realization of the students.
- By this the students organizes the planning things in an order.

Limitations

- It is a time consuming method.
- It is difficult to complete the prescribed syllabus in a particular time.
- It is a very costly method.
- It is not applicable for the lower classes.
- All topics are not able to teach through this method.
- It is not applicable for the all schools.
- It needs so many materials for the execution.

OBSERVATION METHOD

Methods are the ways and means through which the curriculum is transacted through teacher to the students. It is a link in the process of teaching and learning environment.
Observational methods are useful ways in which teachers can build judgements about individual pupils. There is a whole range of methods but some are easier to use in a busy classroom than others. Overall, it is worth thinking about selecting a 'toolkit' of user-friendly methods and making good and regular use of them. They need to be easily understood by the whole class team, teacher and teaching assistants, and should help the team and the parents and others learn about the pupil. Below are some well-established methods which you might consider using to observe the pupils. Needless to say, this is not a definitive list!

Different methods are there in teaching geography. But observation method is something unique and widely acceptable and usable method.

Observation refers to the direct knowledge we receive through things, events of the nature. We can observe through two ways directly and indirectly. Directly we get contact with the real object but it is not always available for direct contact. Through audio-visual and instructional materials, we observe the object indirectly.

Merits:

Students get direct experience through direct method. It activates and energizes their knowledge. It avails much information through easy direct contact. Students actively participate in direct observation. It also helps in presenting the bookish knowledge in an interesting way by mixing one's direct experiences with it. It is also interesting one.

Demerits:

This method is costly, time-consuming and not for all topics. Teacher's facility, skill, time is also a factor. Sometimes indiscipline may develop out of observation.

But this method is more scientific that make geography teaching a concrete base in schools.

The Assignment method

The Assignment method is the most common method of teaching especially in teaching of Science. It is a technique which can be usually used in teaching and learning process. It is an instructional technique comprises the guided information, self learning, writing skills and report preparation among the learners. The Assignment method is an important step in teaching and learning process.

Objectives ofAssignment Method:

Bates defined that the Assignment given in the lesson concerned to the student must train them in self learning and to acquire the presentation skills of the learners. The assignment method inculcates the learning experiences and information retrieval and report writing skills. The following objectives can be derived from the Assignment method.

The diverse and multiple learning experiences must be coordinated with a common method is an important objective in Teaching of Science. The assignment method can integrate and coordinate the different learning experiences of a learner from different approaches.

- It provides good training for information seeking and retrieval behaviour.
- It inculcates the self learning attitude among the students.
- It provides information analysis and research attitude to the learners.
- It develops the learning experiences from various sources.

Steps / Stages in Assignment

In order to achieve the desired objectives from the Assignments, the teacher should mind the following steps / stages before assigning the work to the students.

- The assignment must be Lesson concerned and related with the text books and curriculum.
- The topic / unit of the assignment must be explained with the availability of resources.
- The core of the subject or unit must be clarified.
- The hard and difficult portions of the assignment need to be explained well.
- The topics / units irrelevant to the assignments must be defined very well.

The questions and answers for the assignment provided to the learners mustcomprise the following:

- The questions must investigate the learners / students attitude.
- The questions need to express whether the students have gone through the entire questions and assignment instructions.
- The answers must be simple and smaller in nature.
- The questions must allocate space for diagrammatic illustrations by the students
- The questions can provide experimental work and tools for the students.
- The references and bibliography must be annexed by the students.

Qualities / Features of a Good Assignment:

The significance of the Assignment has not been felt by the students because they were given by the individual without having proper understanding of the objectives of assignment method.(Tram) Assignments given with ambiguous instruction and lesser time to complete the task are also results in to sub-standard work by the students.

So that the teachers should identify the selected units / topics as the assignment work. A good assignment has the following best features and provides a good learning experience. Assignment must be relevant to the subject taught to the student. This should reflect the affinities with the subject contents in the text book concerned. Assignment must be simple and enable the students to complete it within the stipulated time. Assignment must avoid ambiguous, complex information and instructional structure.

Objectives of the assignments must be clear and definite.

Assignment must be given with other methods of teaching enable the good learning experiences.

Assignment should be given ensuring the level of the students' age, attitude, skills and availability of resources for the topic / unit.

Assignment must develop the creativity and capable of individual learning by doing.

Assignments given to the students may challenge their thinking and analysis power.
The group assignments may encourage the coordinated learning among the students.
The difficult task can be handled by fast learners and normal and easier task can be shared by slow learners facilitates students to complete and achieve the objectives of the group assignment.
Generally the selection of the topics / units for the Group assignment must be done by the group of students themselves.

Types of Assignments:
Generally, the assignments are classified in to two types:
viz. Home assignments and School Assignments

Home assignments:
The assignments given by the teacher is completed by the students in their home with the help of reference books and instructions / information provided by the teacher. The Completed assignments were evaluated by the teacher.

School assignments:
Prior to the experiments to be done or any difficult tasks, the teacher interrogates some questions regarding the experiment or tasks. The students have to find the answer with the help of text books and library books and report it in written form. The teacher observes the information collected by the students for the assignments. If the information collected is relevant and sufficient, the students will be allowed to proceed further towards the experiment or tasks. Other wise they are again instructed with further information and clarification to resubmit the assignments. Such assignments are termed and known as School assignments.

Busing has classified the school assignments in to nine types under the following headings.
1. Page or Paragraph Assignment: This assignment deal with the frequently used topic / unit in Text books. Usually assignment confines with a page or few paragraphs only. It is the method of instant answering or reporting in learning activities.
2. Chapter Assignment: This is somewhat broader than the page or paragraph assignment. Its scope confines with a chapter in the text book or a specific topic / unit to be described in the Text books. Generally this assignment based on the contents of the chapter of a lesson hence it is called as chapter assignment.
3. Topical Assignment: Such assignments are based on a chapter or more or a topic interrelated with the text book units. There may be ample opportunities the topical assignments may cross the boundaries of text books and its chapters. This assignment will be helpful in teaching and learning, the every day problems can be correlated with science teaching and learning by the students.

4. Problem Assignment: In order to solve a problem through scientific method this type of assignments were given to the students. The problem solving is its primary objective. The students are trained to learn the problem solving process through this assignment method. This type of assignment is considered as exclusive one.
5. Experience Assignment: This is a traditional assignment method. This type of assignment is usually used in mathematical lessons. Also this assignments will be helpful in problem solving and for other subjects too. This assignment is given along with other assignments.
6. Individual or Group report Assignment: This assignment has given to bring out the actual capabilities of a student or a group of students. It helps to promote the cooperative learning and information seeking behaviour among the students. It is considered as one of the special methods to develop and promote the individual's learning experiences.
7. Unit Assignment: This assignment confines with a particular unit of the text book. It helps to avoid the ambiguous and repetitive information from the units of Group discussion. The central idea / core theme of the text can be supported by this unit assignment. Duplicate and unauthentic ideas and information are filtered in this unit assignment.
8. Experiment Assignment: This assignment has the best features from the problem assignment and project method. Basically this assignment evolved from the laboratory experiments and its reports. But this assignment could not be used as a representative for testing hypothesis. This is a best tool for the learning and teaching process.
9. Practice Assignment: This type of assignment is usually given in mathematics. This is given to the students to reinforce their memory skills and retention of the concepts. The repeated exercises can be given through this assignment. Memorizing poems, tables, theorem etc., can be done through this method.

Fundamental Elements of Assignments:

- Assignments must be clear and well defined.
- It should be precise as well as having sufficient information enable to complete the task by all
- students.
- The Teacher should clear the obstacle of the assignment proposed.
- Newer topics for the assignments must be proposed with the earlier learning experiences.
- Students must have a proper understanding about the assignments.
- Students need to understand the importance of assignments.
- Assignments proposed must be interesting enable to complete within the stipulated time by the students.
- Assignments must balance the skills and interests of the students as well as with their age and attitude.
- Assignment must enhance the interest in learning experiences of the students.

- Appropriateness in assignment is accepted. There should not be credits or debits for best and worst assignments respectively.
- Assignments must direct the students towards the appropriate learning methods for the lesson in the text books.
- Assignments proposed must consider the individual differences of the students and their time
- management skills.
- Library and laboratory facilities are mandatory for completion of assignments.

Teacher's Role in assignment method:

In order to achieve the effective learning experience among the students through the Assignment method teacher has his / her own important role and functions in this method. The following role and functions are considered mandatory for every teacher when executing the assignment method.

- In teaching of Science subject the lesson is divided into easier and appropriate parts that should be enable to pursue as assignment topics.
- The assignments must be interrelated and develop from one to another gives good learning experiences.
- Teacher must have some targets in the learning experiences that to be acquired by the students from the assignments.
- Before giving the assignment works to the students' progress sheet should have been prepared by the teacher.
- Teacher should have the complete bibliography and references for the subject he assigned for the assignments to the students.
- The reference and required information must be given with guidelines to the students when they opt for assistance in their assignment as well as in other academic works.
- The teacher must have the list of the assignments and its feed back with the problem solving
- guidelines to reduce the gaps in learning process among the students.
- Active sheets must be prepared and kept under his custody for the experiments and laboratory work.

The planned and programmed assignment method yields a good learning experience and better results also facilitate the further follow up academic activities such as Laboratory work, experiments and projects. The planned and well defined assignments found simple and interesting to the students and enable them to complete the work effectively within a stipulated time.

Advantages / Merits of assignment method:

- Provides opportunity in self learning for the students

- Better learning experiences will be gained when combined with other science teaching methods.
- Assignment provides sufficient flexibility in learning pace of the students. The slow learners too adapt with this method.
- Teachers' interruption is very much reduced and the students' active participation is encouraged.
- Teacher acts as a role of guide only.
- The students received a better training in the learning by doing method in this method.
- The information seeking and retrieval behaviour is developed among the students.
- It gives better understanding in scientific method and projects.
- It can provide space for the individuals learning attitude and their speed in learning process.
- This provides better feed back and gives exact solution for the problems faced by the student in the learning process.
- The progress sheet shows each and every student achievement and records his strength and weakness of the students learning activities.
- The learning by doing aspect in this assignment method promotes the self confidence and self respect of each and every student engaged in assignment work.
- Additional bibliographic information and references provide a good in depth knowledge among the students in the subject they work.
- Teacher himself improves his awareness about the students' achievements.
- The student has his own responsibility in learning process.
- The experimental works can be done with ease and simple way.
- The difficult experiments are demonstrated by the teacher so that there is no risk.
- Individualized instruction and attention is possible in this method.

Limitations

There are some demerits and limitations in this assignment method for both teachers and students. For the Teachers:

- It is time consuming and burden process.
- Teacher has to collect the information from various sources before assigning the work to the students.
- Work burden extends in holidays too. There will be no encouragement for his work.
- There are no source books and guide books are available in the market. Teacher has to prepare the same at his own risk of time and money.
- There are divergent group of students in a class, it poses problems for teacher assigning a unique or uniform topic for assignment.
- The success of the assignment method largely depends on library and laboratory facilities provided for the teacher as well as students.

- The teacher has to examine the copy work and eliminate it.
- The slow learners need much more attention from the teacher. Again it gives more burden for the teacher.

For the Students:

Time consuming. Need to spend more time in seeking information and its retrieval. The time limit given threatens the students which makes the substandard work. The slow learners stay behind. They tend to copy others works.

It is found hard for the students having little scientific attitude.

The report writing is little bit costly.

4. Grouping students for learning

a) Cooperative learning

b) Using structured questions to aid learning

c) Role playing and simulation

Implementing Cooperative Learning

Cooperative learning is more than merely having students sit together, helping the others do their work. Directing students who finish their work early to assist others isn't a form of cooperative learning either. Neither is assigning a group of students to "work together" UNLESS you assure that all will contribute their fair share to the product.

A true cooperative learning experience requires that a number of criteria be met. They are:

-Division of labor among students in the group
-Face-to-face interaction between students
-Assignment of specific roles and duties to students
-Group processing of a task
-Positive interdependence in which students all need to do their assigned duties in order for the task to be completed
-Individual accountability for completing one's own assigned duties
-The development of social skills as a result of cooperative interaction
-Provision of group rewards by the teacher

The introduction of "learning teams" into the classroom is an effective method for increasing the number of students willing to make an effort to learn in school. The teams usually work together on long-term assignments, although sometimes students remain together in duos, triads or quadrants for the entire day. In these groups, each individual is responsible for assuring that the other team members learn the assigned material. Those who understand the lesson/material are responsible for teaching it to the others. Groups progress to a new unit of study when all members of the group have mastered the lesson.

Group members are also responsible for the behavior of all members. If a team member displays inappropriate behavior, it is the duty of fellow members to remind that student to `check' him/herself. The members attempt to refocus the misbehaving student by offering help and suggestions.

Initially, temporary grouping can help students to grasp the concept of long-term learning teams, and practice responsibilities while the teacher sharpens his/her skills and receives feedback from the students regarding how to improve assignments.

Steps for setting up group learning experiences:

Before Implementation

1. Develop a positive classroom environment. Devise ways for students to become acquainted early in the year. Have them work on a mural, newsletter, play or other project. Model and encourage polite, respectful behavior toward others. Reward students for such social skills as helping others, giving and accepting praise, compromise, etc.

2. Previous to organizing collaborative groups and assigning academic tasks, develop a cooperative climate and esprit de corp in the classroom. This can be accomplished by engaging students in fun team-building activities in which they support each other in a team effort to achieve non-academic or easily achieved academic goals. These activities might take the form of non-competitive, active games such as those described in the books like the one titled Play Fair.

3. Consider upcoming academic tasks and determine the number of students who will be assigned to each group. The size of the group will depend on the students' ability to interact well with others. Two to six students usually comprise a group.

If students are new to cooperative learning, assign two or three individuals to a group. Increase the size of teams as the students become familiar with the procedures and practices. Although homogeneous grouping or random assignment to groups is sometimes used, the students should usually be on a range of levels, mixed by intellectual ability or achievement level. One novel way to form groups is to have students pick a puzzle piece out of a hat/box. Inside that container are several 3 or 4 piece puzzles. Students match up their pieces to see who will be in the group with them. Too random? Hand out sheets of paper with directions/material on it, and a puzzle piece attached. While appearing to be a random selection to the students, you have determined which kids will come together into a particular group.

The teacher may also choose to consider interests or abilities in certain subject areas, personality, race, gender, or other factors when teaming students with each other. Perhaps the groups will choose names for themselves or decide to be referred to merely by number.

4. Decide how long the groups will work together. It may range from one task, to one curriculum unit, to one semester, to a whole year. Most often the teacher will vary the composition of groups every month or two so that each student has a chance to work with a large number of classmates during the term or year.

5. Determine the academic and behavioral/interpersonal objectives for the task.

6. Plan the arrangement of the room for the upcoming group-oriented tasks. Arrange group seating so that students will be close enough to each other to share materials and ideas. Be sure to leave yourself a clear access lane to each group.

7. Prepare materials for distribution to the group. Indicate on the materials that students are to work together. Avoid work activities that don't really encourage (or require) students to actively collaborate in a group. When student are working on independent tasks, simply clustered at tables, a revision is necessary.

8. Determine roles for group members. In addition to cooperating and "brainstorming" with others, each group member should be assigned a duty to perform during the project. For example, the positions of "starter" (first person to use the materials; supervises any assembly of materials), "encourager/taskmaster" (motivates others to work their hardest and contribute to the discussion), "reader" (responsible for seeing that all members begin with the same information and understand the nature of the task; reads print instructions and reviews record sheets aloud to the group), "praiser" (reinforces the responses of others), "researcher/getter" (locates and obtains needed materials and information; returns materials after use; in charge of inventory), "summarizer/reporter" (periodically explains what has occurred and later presents group findings to the entire class), "recorder" (writes down all important data, decisions, contributions, accomplishments, etc.; writes results on the board when sharing with the entire class), "understanding coach" (makes sure that everyone understands what has occurred to this point), and "checker" (assures that all have completed their task and looks for errors in data, writing, etc.) might be appropriate to the assignment. The teacher may have to explain and demonstrate/practice these roles previous to and during projects. Our junior scholars need to know what the roles actually look and feel like in order to play each role well, and re-direct their teammates when necessary in order to ensure productive performance.

Implementation

9. Explain what will occur. Explain the rules which include; contributing to the team effort; listening to teammates; helping other team members; and asking the teacher for help only if it is

a question of everyone in the group. Previous to this, you should have devised a way to eliminate groans and complaints from high achievers and socially popular students who may not approve of the composition of their group. Arrange students into teams at tables or where desks have been pushed together.

10. Present and clearly explain the assignment that will probably take several class periods to complete. (e.g.. Make a collage of items that start with the letter "M"; Plan and act out a play demonstrating how Thomas Jefferson might react if he were to be brought through time to see the United States as it exists today; Using an unabridged dictionary, make a list of words which can't be rhymed with other words etc.) Emphasize that positive interaction and cooperation will result in a group reward, and that meeting a set standard of performance beyond expectations will result in bonus points. Perhaps those points can be awarded frequently during the activity to motivate further cooperation.

Cooperative interaction can be more fully assured by giving only one copy of materials to each group, or by assigning each student one part of the materials with each part being needed for completion. Consider allowing groups that finish early to assist slower groups. This helpful support of other teams can be promoted through the understanding that if all groups reach a preset level, more bonus points will be given. The evaluation standard should be criterion referenced (judged against a certain standard reflecting degree of learning).

11. Avoid the temptation to "lead" the groups. Your role has changed from transmitter of knowledge to mediator of thinking. Praising and encouraging the less academically skilled team members is still indicated however.

12. Monitor and assist as needed. Move among the groups to assure that they are actively engaged in their roles and following designated procedures (unless free-form creativity is desired). Do not answer student questions unless the group members are unable to resolve the issue by themselves. Intervene as necessary to promote positive interdependence among group members. Frequently reinforce positive group interaction.

13. Evaluate each group's performance/product. Grades might be assigned based upon the average performance of the group (thus promoting positive interdependence) or the effort/quality of performance of individual members in the execution of their duties. In many cases, each group decides how it will demonstrate what has been learned. Each group's work is judged on its own merit rather than in comparison with the outcomes of other groups. If inter-group competition is involved, perhaps the winning and most improved teams will receive a prize. Recognition might also be given to groups that were the quietest, quickest, neatest, most creative, etc.

After Implementation

14. Have the learning groups assess how well they worked together and discuss how they can improve their functioning and performance.

Summary

Cooperative learning is gaining popularity for a number of reasons. Evidence indicates that it raises achievement, promotes positive self concept, and raises regard for others. It appears to be especially useful for students from racial minority and low socio-economic groups who have not excelled to the same degree as middle income majority-culture pupils in the traditional competitive classroom. The performance of these previously less successful groups tends to rise in cooperative groups, majority culture students seem to achieve just as well as with the individually-oriented style of instruction and learning, often better. Cooperative learning may also help to lessen the fatalistic attitude toward schooling that is often found among students from minority groups and those who have experienced repeated failure in the schools. When these students notice the value of their input and effort, a more internal locus of control and belief in one's ability is fostered. Social and work skills are imbedded.

Implementing full-scale cooperative learning is not a simple task. Teachers may wish to start with periodic lessons or units and build from there. The effort expended is probably well spent as "...what we know about effective instruction indicates that cooperative learning should be used when we want students to learn more, like school better, like each other better, and learn more effective social skills."

Activities and Discussion Questions

1. Locate and read books on the use of cooperative learning such as William Glasser's Control Theory in the Classroom (1986, New York: Perennial Library Press) or Roger Johnson's Circles of Learning (1985, available from the Cooperative Learning Center of the University of Minnesota, Minneapolis, MN).

2. Locate books on cooperative games as a way to build esprit de corp and promote the concept of cooperation in a fun format.

3. Join with a few other teachers who wish to learn more about cooperative learning. Form your own learning teams and give yourself the assignment of helping all members figure out how to most effectively use cooperative learning in their classrooms.

4. Decide whether cooperative or competitive learning methods would be best for the activities or areas of study below.

-Painting a picture
-Multiplication drills
-South American geography

-Simulated journey to the moon
-Oriental architecture
-Computer use
-Baking bread

5. Think of material or concepts which are to be learned by your classes during the upcoming weeks or months. For which of these would cooperative learning best serve your purposes? For which of these would competitive practices work best in promoting learning among the greatest number of students?

6. Suppose you wish to have your students produce a class newsletter. What groups might you form and what would be the duties of each? What duties or roles might be assigned to members of the groups?

7. Consider the following statement and discuss with others how the concerns voiced within might be addressed.
" One of the rationales of grouping children up in the classroom is that each child has some particular strength and that will be brought out by the wide variety of tasks that are assigned to the group. In this way, the thinking goes, students who are good at one skill can be a leader in that area, while another child, who has different strengths, will take over in a different area. A favorite example given is the child whose basic skills are very low but who draws very well. So the teacher enthusiastically groups her with one of the higher level students, knowing that she can contribute to the group via her artistic skills. She has something to offer the group that perhaps the others don't have, and it allows her to shine even in an academic project. It sounds great, but a few questions nag. Like, what if she doesn't always want to be the group artist? What if her drawing is a very personal thing to her and it embarrasses her to have it made public? In my training I have been told by many teachers that they always pair up the weakest student in the class with the strongest. In this way, the teacher can tap the resource of the strong students and use them to help teach their fellow classmates within the classroom community. I think that this is perhaps the problem that I have the greatest difficulty with. Why should the so-called quicker students be obliged to teach their fellow students all the time? Do they have a choice in the matter? I know many people who, in their school days, whizzed through their work, and then were able to do all sorts of extra reading and projects on their own. Is there something wrong with that? Many of these students, as well as the children I have observed in my own classrooms, were not quick in just one area, but had strong skills in almost all areas. They were the kids who were `good at school'. If they were going to do a group project, they wanted to pair up with kids who were on a similar level, which in my assessment, was because on some level they understood that they would be stimulated by each other. I think it's a mistake to think that a child who shows strong academic and/or leadership qualities wants to be in that situation all the time. Sometimes they want a break. And sometimes, they may want to coast. And sometimes

they want to work alone. I find myself returning again and again to this notion of balance. When we stick to one model inflexibly, many personal needs are likely to go unmet."

Structural Learning Theory

Model Description
Structural Learning Theory is a prescriptive model that suggests learners should start to develop rules for problem solving. In developing rules, the learner needs to fill the gaps in the problem and in doing so, learns problem solving.

Specification of Theory
(a) Goals and preconditions
Problem-solving

(b) Principles
1. Teach higher order rules that can be used to derive lower order rules.
2. Teach simple solution paths and lead to more complex paths.
3. Rules must be composed of the minimum capabilities possessed by the learner.

(c) Condition of learning
1. This theory is based on interaction between a tutor and on or more learners.
2. Technology may fill the role of tutor.
3. The structural (task) analysis determines the rules required to solve the problem.

(d) Required media
None

(e) Role of facilitator
External agent (especially a tutor) that influences learning.

(f) Instructional strategies
1. Use structural analysis to identify the problem domains (input and output for problem solving).
2. Develop a hierarchy of rules for the problem domain. Start with prototypical examples. These prototypes may leave gaps.
3. Convert these gaps into higher-order problem that contains the rules for the gap.
4. Filling the gaps with the higher-order rules help to validate lower level rules and allow for consolidation of redundant rules.

(g) Assessment method

The learner can use higher-order to problem solve in complex and ill-defined domains. The learner can distinguish between lower and higher-order rules. Learner identifies enabling rules to solve problem.

Role Play and Simulation

Overview

Role play and simulations are forms of experiential learning (Russell & Shepherd, 2010). Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings.

The terms "role play" and "simulation" are sometimes used inconsistently or interchangeably. However, "simulations" often involve a familiar or realistic situation in which a participant's role may not be as prominent or distinctive as it would be in a role play. Frequently simulations incorporate role play, leading to the term "role-playing simulation". The difference is generally one of degree rather than kind.

Role plays and simulations function as learning tools for teams and groups or individuals as they "play" online or face to face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Students are actively involved in both self and peer assessment and obtain sustainable formative feedback.

Qualities of an exemplary social science teacher

1. Build rapport with students; know their individual learning characteristics, prior knowledge, skills and experiences.
2. Relate the subject matter to students'' lives (especially in terms of social and personal perspectives) in an enthusiastic, engaging manner.
3. Show sensitivity to cultural and individual differences.
4. Provide challenging, rigorous, learning experiences for students.
5. Make the classroom an equitable environment for learning to occur.

In their Teaching Methodology and Teaching Environment, excellent teachers:
1. Stress practices of science and the role of evolution in investigations, discussion, and questioning at every opportunity.

2. Maintain current subject matter knowledge and incorporate up-to-date biological theory in their classrooms.
3. Follow an integrated approach to topics by incorporating other subjects, technology, society and ethics.
4. Use a variety of research-based teaching methodologies rather than relying on lectures.
5. Incorporate laboratory and outdoor experiences whenever possible.
6. Provide a safe environment at all times in the laboratory and outdoors.
7. Develop precise, measurable, learning outcomes and assess them using a variety of methods.

In their Reflection and Professional Involvement, excellent teachers:
1. Continually analyze, evaluate, and strengthen their practice through reflection.
2. Actively participate in professional science education organizations.
3. Strive to improve themselves and others through professional reading and writing, attendance and presenting at workshops and conferences, and additional formal education.
4. Contribute to the quality of the teaching practice of their colleagues and to the instructional program of the school. They are leaders within their schools and participate in the broader science education community.

In their Family and Community Involvement, excellent teachers:
1. Communicate positively, frequently, and in a variety of ways, with parents and guardians about the status of their students' learning and successes, in accordance with applicable laws and local policies.
2. Involve students in community projects, field trips, investigations, and service endeavors.

Unit - III: Concepts and Technology Integration (18 hours)

- Developing Concept and Generalizations
- Concept formation and classification
- Concept Mapping in Social Science
- Instructional strategies for concept learning
- Technology Integration: Planning with the iNtegrating Technology for inquiry
- (NTeQ) model for Social Sciences at secondary school level.

Developing Concept and Generalizations

Shiveley&Misco (2009) suggest that generalizations are a logical step in teaching kids to think critically about what they know and transferring that knowledge to a variety of topics within the social studies. After understanding the relationship between "fact" and "concept" students will

be capable of producing high-quality generalizations that eliminate isolation of ideas and stimulate crossover and relevance to the social studies curriculum.

Research Summary

The authors suggest that a critical component to understanding the need for generalizations is the ability to discern between fact and concept.

Fact: a specific and often isolated piece of information that is believed to be true and which can be confirmed by empirical evidence

Concept: an idea used to organize a class of objects or experiences, typically one or two words, which may be concrete (dog, chair) or abstract (love, justice).

Generalizations: a statement of a relationship between two or more concepts. It is believed to be true and applies to similar situations regardless of time, space, and culture. This statement may be used as a tool for prediction and is often framed as an if/then statement.

It is imperative to understand that the authors utilize generalizations in their article such that they are not bounded in the past or restricted to a particular place and time. Nomothetic generalizations have "predictive explanatory power" and have some sense of "universal validity" thus making them useful for student experimenting and hypothesizing to increase engagement within the course.

The authors also offer guidelines that any statement that includes a reference to a specific time ("during the 1800s"), place ("in the American West"), or culture ("Native Americans often…") should not be accepted as a generalization so as not to confuse the learner and maintain uniformity.

The value of utilizing nomothetic generalizations in class is that it allows the learner to make bold statements and test them out in a wide variety of contexts. Math and science classes adopt generalizations as second nature and show the strengths and importance of allowing students to transfer their knowledge and findings to situations inside the classroom as well as outside of the classroom thus leaving a lasting impact on the learner and relevance to the social studies curriculum.

Classroom Implications

The researchers specifically discuss the lack of generalizations in social studies classrooms to be a result of standardized testing and the increased burden of standards. In addition, they

acknowledge the disconnect between students and the social studies curriculum as many perceive the discipline to be "dull, irrelevant, and boring." To this, they make one, telling statement:

Not only does a focus on generalizations have the promise to enhance vibrancy of classes and student interest, but it also has the potential to raise test scores through enhanced understandings of the content and improve the development of citizenship skills and dispositions.

Concept formation and classification

Concepts are the categorization of objects, events, or people that share common properties. By using concepts, we are able to organize complex notions into simpler, and therefore more easily usable forms. Concept formation is the process by which we learn to form classes of things, event, people, and so forth.

While research on learning in animals has been used by some psychologists as evidence that primates at least, if not other species, are capable of concept formation, and computers have been programmed to process information by using and developing classification rules, these accomplishments are all relatively impoverished compared to human concept formation. For human beings, concept formation is essential to our life in the complex world of interactions with not only objects but also people and abstract ideas.

Child developmentalists, such as Jean Piaget and Lev Vygotsky, have researched the way children form their own concepts through experience, assimilate existing concepts such as cultural values, norms, and beliefs from adults, and further create and develop their own concepts as they mature toward adulthood. Cognitive psychologists, like Eleanor Rosch, have suggested that rather than a strictly logico-mathematical form of classification people develop natural categories that are graded, involving "prototypes," or typical examples.

Prototype theory has helped us to understand how we form concepts about our world, which contains from the start naturally occurring things. However, as Vygotsky noted, we learn much from our social interactions, and thus human concept formation is neither based on purely physical, concrete characteristics of objects, nor strictly on abstract, logico-mathematical principles. It reflects the everyday experiences we have with the natural and social worlds, together with our subjective, personal, and cultural interpretations we give to them, creating and defining new concepts as we interact with our world, ever seeking to understand all that we encounter and innovating, creating new and better concepts and substantial objects that improve the quality of our lives.

Concepts and categorization

Concepts are generalized ideas that represent a class of objects or events. A concept is an abstract idea or a mental symbol, typically associated with a corresponding representation in language or symbol, that denotes all of the objects in a given category or class of entities, interactions, phenomena, or relationships between them. Concepts are abstract in that they omit

the differences of the things in their extension, treating them as if they were identical. They are universal in that they apply equally to every thing in their extension. Concepts are also the basic elements of propositions, much the same way a word is the basic semantic element of a sentence. Unlike perceptions, which are particular images of individual objects, concepts cannot be visualized. Because they are not, themselves, individual perceptions, concepts are discursive and result from reason. They can only be thought about, or designated, by means of a name. Words are not concepts. Words are signs for concepts.

Concepts lighten the load on memory and enhance our ability to communicate. For example, at the airport when asked what you have in your suitcase, you never answer with a detailed list of items: two jackets, a pair of Austrian shoes, four Greek shirts, the Bible, Introduction to Psychology, documents on Western Civilization, and so forth. More likely your answer will be "clothes" and "books." Using these categories reflects the operation of concepts.

Categorization is the process in which ideas and objects are recognized, differentiated and understood. Categorization implies that objects are grouped into categories, usually for some specific and cognitive purpose. Ideally, a category illuminates a relationship between the subjects and objects of knowledge. Categorization is fundamental in decision making and in all kinds of interaction with the environment. There are, however, different ways of approaching categorization.

Concept formation in humans and animals

Generally speaking, concepts are (a) acquired dispositions to recognize perceived objects as being of this kind or of that kind, and at the same time (b) to understand what this kind or that kind of object is like, and consequently (c) to perceive a number of perceived particulars as being the same in kind and to discriminate between them and other sensible particulars that are different in kind. Therefore, we can also say that concepts are shaping and directing forces in behavior. In fact, concept formation for animals is the process that we traditionally call learning. Experiments in animal learning generally involve discrimination between stimuli with different characteristics, say a red object rather than ones of other colors, a lighted passageway over a darkened one, the larger of two objects, or even the different one from a group. Such studies have suggested to some psychologists that animals are capable of a primitive level of concept formation.

There should be a few additions for human behavior, however: Concepts are acquired dispositions to understand what certain kinds of objects are like both (a) when the objects, though perceptible, are not actually perceived, and (b) also when they are not perceptible at all, as is the case with all the conceptual constructs we employ in physics, mathematics, and metaphysics.

Images, concepts, and symbols are the basic units of thought. Images are picture-like mental representations. Seeing something in our "mind's eye" is similar to seeing real objects. Information from the eyes normally activates the brain's primary visual area, creating an image. Other brain areas help us recognize the image by relating it to store knowledge. When we form a mental image, the system works in reverse. Brain areas where memories are stored send signals

back to the visual cortex, where once again, an image is created. For example, if we visualize a friend's face, the area of our brain that specializes in perceiving faces will become more active.
Geologists use the earth's sediment layers to infer past events. Physicists cannot observe gravity directly, even though they study its effects. In similar fashion, we use images to think, remember, solve problems, and make decisions. Images allow us to scan information stored in memory, and to help us plan a course of actions. The insight of Albert Einstein into the Theory of relativity occurred when he created a visual image of chasing after and matching the speed of a beam light (Kosslyn and Koenig, 1992). Later he turned this visual image into "words and symbols."
Though visual imagery is dominant in our everyday life, images do not have to be only visual. They can also be auditory and even olfactory (involving the sense of smell). According to the data of cognitive psychology, ninety-seven percent of people have visual images, ninety-two percent have auditory images, and fifty percent have imagery for movements, touch, and smell.

Concepts and performance

Concepts can influence and determine behavior. We would assume, for instance, that it might be appropriate to pet an animal after determining that it is a dog, whereas we would behave differently after classifying the animal as a wolf.
To describe figuratively the influence of concepts on our performance, consider the following example. Suppose, we are driving a car in New York City and want to arrive at a specific location in the center of the city. A street map of the city would be a great help to us in reaching our destination. Suppose, however, we were given the wrong map, say the map of Los Angeles. The map by itself is not wrong; but it is useful for driving in Los Angeles, not in New York. Thus, it is easy to understand the ineffectiveness of trying to reach our destination. In this example, the map is the prototype for a concept. Only in the case of having the right map, the right prototype, does our behavior become effective. So, the map, or the prototype, should be the right one in order to perform an adequate and effective behavior.

Concepts are the categorization of the world

We acquire concepts by learning and forming rules. For example, orange, apple, and pear are included into the concept "fruit." A conceptual rule is a guideline for deciding whether objects or events belong to a concept class. A triangle must be a closed shape with three sides made of straight lines. Concepts help us classify newly encountered objects on the basis of our past experience. We can surmise that someone tapping a hand held screen is probably using some kind of computer, even if we have never encountered that specific brand before. One way we classify something as an example of a concept is to use rules that tell us what an instance of the concept is and what is not. Objects that follow the rules and have certain properties are called positive instances of the concept. The absence of such properties is the mark of a negative instance of the concept. Such rules work well for defining a concept such as "triangles" delineated above: closed, two-dimensional figures, with three sides, and angles that sum to 180 degrees.

Language is the communication of information through symbols according to definite and systematic rules. Language consists of symbols and/or words, as well as of rules for combining them. Grammar is the system of rules that determine how our thoughts can be expressed. Semantics are the rules governing the meaning of words and sentences. Concept formation is the process of integrating a series of features that group together to form a class of ideas or objects, in that way classifying information into meaningful categories. Conceptual rules are formal rules for deciding whether an object or an event is an example of a particular concept.

Types of concepts

Three types of concepts are differentiated: Conjunctive, rational, and disjunctive. Conjunctive concepts are defined by the presence of at least two features, which means that a conjunctive concept is a class of objects that have two or more common features. Rational concept is defined by the relationship between the features of an object or between an object and its surroundings. This means that rational concepts are based on how an object relates to something else, or how its features relate to one another. Disjunctive concepts are either/or: they have at least one of several possible features. Disjunctive concepts are defined by the presence of at least one of several possible features.

Denotative and connotative meanings

Concepts have two meanings: denotative and connotative. When saying denotative meaning, we understand the objective meaning of a word or a concept, how the word or the concept described in dictionaries and encyclopedias. When saying connotative meaning, we understand the subjective meaning of a certain word or concept, its emotional meaning, the meaning deriving from personal perceptions.

Those philosophers, who emphasize the connotative meaning of words and concepts, declare that systems of categories are not objectively "out there" in the world but are rooted in people's experience. Therefore, many conceptual categories—especially value-based categories—are not connotatively identical for different cultures, or for each individual within the same culture.

Prototypes, stereotypes, and faulty concepts

Images, concepts, and symbols are not enough for the functioning of human thought. We can have many situations when the usage of rules and features is not enough for our thought. Thinking of the concepts, fruit or bird we usually do not use rules and features; we base our thinking on prototypes which are ideal models used as a prime example of particular concepts. Prototypes are typical and highly representative examples of a concept. Rules are an efficient way to learn concepts, but examples remain important. It is unlikely that memorizing rules would allow a new listener to accurately categorize music as punk, hip hop, fusion, salsa, heavy metal, grunge rock, rap music, and so forth.

Stereotyping is used for concepts about people and refers to our cognizing and understanding of the socially, racially, and ethnically diverse world. Social stereotypes are oversimplified images of people in various groups. This means that stereotyped thinking tends to simplify the images of

the traits of individuals who belong to a particular group. In general, the top categories on which most stereotypes are based are gender, age, race/ethnicity, place of residence, and social class. As a rule, stereotypes are either positive or negative, and tend to divide people into "us" and "them" categories.

On the one hand, stereotypes make the social world more manageable. On the other hand, stereotypes tend to grow into faulty concepts which can lead to thinking errors as well as to behavior and/or personality maladjustment. Stereotypes may be viewed as "all-or-nothing thinking." In this case, we classify things right or wrong, good or bad, fair or unfair, black or white, honest or dishonest. Thinking this way prevents us from appreciating the subtleties of life and also makes the world appear very poor and colorless. Placing people in categories always causes them to appear more similar than they really are. As a result, we tend to see out-group members very much alike, even when they are as varied as our friends and family. People who are not prejudiced work hard to actively inhibit stereotyped thoughts and to emphasize fairness and equality. A good way to tear down stereotypes is to get to know members from various ethnic and cultural groups as individuals.

Algorithms, heuristics, and decision making

When solving a certain problem or making any decision, human beings are apt to use definite strategies of thinking, which psychologists call algorithms and heuristics. Algorithms are systematic procedures for solving problems by evaluating all possible solutions until the correct one is found. An example of an algorithm is the method of picking out the largest number from an unsorted list of numbers. The solution necessarily requires looking at every number in the list, but only once at each. From this follows a simple algorithm:

Assume the first item is the largest.

Look at each of the remaining items in the list, and if a particular item is larger than the largest item found so far, make a note of it.

The last noted item is the largest in the list when the process is complete.

Algorithms do not provide answers when the problems are not clearly specified. There are no procedures that can be set up in advance to guarantee a solution for such problems. Some problems are so vast that algorithms are simply out of question. Chess players cannot rely on algorithms only.

Heuristics constitute another strategy or technique that aids problem solving by limiting the number of possible solutions to be tried. Imagine you are in Athens, Greece and decide to look up an old friend Artemis Pipinelli. You open the phone book and find fifty-three A. Pipinellis. Certainly, you would not dial all 53 numbers until you find the right one. You will probably think, "Is there any way I can narrow the search." You remember hearing that Artemis lives by the beach. You take out the map and call only the numbers with addresses near the waterfront (Ellis and Hunt, 1992). You are using the heuristic strategy of problem solving and decision making. Like algorithms, a heuristic strategy is also an example of trial-and-error thinking, in which all possibilities are tried.

Computers and problem solving

Computers have provided scientists with a way to develop and test models that can be used to understand human thinking more thoroughly. The calculation of possible moves when playing chess is one example. In these applications, a machine is essentially performing the process of problem solving used in concept formation. Many aspects of human concept formation have not yet been successfully modeled by computer, yet there is also no evidence that human concept formation is based on any method of handling information that could not be programmed into a machine.

In medicine, physicians are interested in structural and functional imaging of brain (which is done through computers) for diagnostic purposes in order to make the treatment more effective. At the same time, researchers obtain new knowledge about the functions of higher mental processes, including the process of concept formation. Contemporary neuroscientists use four computerized techniques—microelectrodes, macroelectrodes, structural imaging, and functional imaging—to understand and to diagnose the principles of brain work.

Theories of Concept Formation

Theories of concepts and concept formation are those which try to understand and explain the principles and ways concepts are formed and how the thinking process as a whole develops.

Concept formation is one of the basic terms in the theory of cognitive development of Jean Piaget. Children loved talking to Jean Piaget, and he learned much by listening to them carefully—especially to their explanations, which no one had paid attention to before. All his life, Piaget was absorbed with studying the way children think, form concepts in their mind, and gain knowledge about the world as they grow. His research revealed that children begin by classifying based on concrete, physical attributes, later forming abstract concepts, developing hierarchical structures, and being able to perform complex transformations.

The development of language also involves concept formation. While some aspects, such as name learning, may be based on the same principles as discrimination learning, grammatical structures and their transformations involve complex concept formation.

The sociocultural theory of Lev Vygotsky seeks to explain persons' knowledge and the process of concept formation in terms of the guidance, support, and structure provided by the elders and the society as a whole, according to its social values and societal principles. This approach is particularly significant in studying the development and learning of cultural beliefs and other subjective concepts that are based more on human interpretation than on purely objective features of the physical world.

The Classical View

The classical Aristotelian view claims that categories are discrete entities characterized by a set of properties which are shared by their members. These are assumed to establish the conditions which are both necessary and sufficient to capture meaning.

According to the classical view, categories should be clearly defined, mutually exclusive, and collectively exhaustive. This way, any entity of the given classification—universe belongs unequivocally to one and only one of the proposed categories.

Ayn Rand's formulation

The first step in concept formation, called differentiation, is to isolate two or more things as belonging together, as units of the same class. Where many theories of concept formation hold that such isolation begins by noticing degrees of similarity, Ayn Rand's Objectivism holds that it starts by noticing degrees of differences. In psychology, particularly studies of animal learning, this process is known as discrimination. At the perceptual level, everything is different; however, some things are more different than others. The difference between two tables, for instance, is less than the difference between a table and a chair. Because two tables are less different from one another when contrasted against a third object, we group them together as units, as members of a group of similar objects.

Ayn Rand defines similarity as: "the relationship between two or more existents which possess the same characteristic(s), but in different measure or degree." Similarity is a matter of measurement. Going back to the table versus chair example, the difference between tables is a quantitative one-we can easily stretch one table into another, so we call them similar. The difference between tables and chairs, on the other hand, is qualitative, so we distinguish between these as belonging to another group. They are different qualitatively both physically, since chairs have a back that no amount of normal stretching can produce from a table, and functionally, since the purposes of chairs and tables are different. However, by going a little further in the manipulation one can make a chair from a table, and one can certainly sit on a table and put a plate of food on a chair. Thus on a broader level the difference between chairs and tables is quantitative, and indeed both can be categorized as furniture.

The second step of concept formation, integration, is based on a process Ayn Rand called measurement omission. In this step, we combine or integrate the units into a new, single mental unit by eliding the quantitative differences between the two units. We retain the characteristics of the units, but we elide the particular measurements-on the principle that these measurements must exist in some quantity, but may exist in any quantity. For example, when forming the concept table we retain the distinguishing characteristics—a flat, level surface and supports—but omit the particular measurements of those features. Based on this two-step process, Ayn Rand defined concepts as: "a mental integration of two or more units possessing the same distinguishing characteristics, with their particular measurements omitted."

Cognitive science: Prototype theory

Since the research by Eleanor Rosch and George Lakoff in the 1970s, categorization can also be viewed as the process of grouping things based on prototypes. The term prototype was been defined in Eleanor Rosch's study "Natural Categories" (1973) and was first defined as a stimulus, which takes a salient position in the formation of a category as it is the first stimulus to be associated with that category. Later, she redefined it as the most central member of a category.

It has been suggested that categorization based on prototypes is the basis for human cognitive development. This proposal is particularly significant since necessary and sufficient conditions are almost never met in categories of naturally occurring things. A cognitive approach accepts that natural categories are graded (they tend to be fuzzy at their boundaries) and inconsistent in the status of their constituent members. Prototype Theory uses graded categorization, where all members of a category do not have equal status. For example, chair is more prototypical of the concept furniture, than, say, lamp.

As formulated by Eleanor Rosch, prototype theory was a radical departure from traditional necessary and sufficient conditions as in Aristotelian logic, which led to set-theoretic approaches of extensional or intensional semantics. Thus instead of a definition based model, e.g., a bird may be defined as elements with the features [+feathers], [+beak] and [+ability to fly], prototype theory would consider a category like bird as consisting of different elements which have unequal status, e.g. a robin is more prototypical of a bird than, say a penguin. This leads to a graded notion of categories, which is a central notion in many models of cognitive science and cognitive semantics, such as in the work of George Lakoff (Women, Fire and Dangerous things, 1987).

The other significant notion related to prototypes is that of a "Basic Level" in cognitive categorization. Thus, when asked What are you sitting on?, most subjects prefer to say chair rather than a subordinate such as kitchen chair or a superordinate such as furniture. Basic categories are relatively homogeneous in terms of sensori-motor affordances—a chair is associated with bending of one's knees, a fruit with picking it up and putting it in your mouth, and so forth. At the subordinate level (e.g. [dentist's chairs], [kitchen chairs] etc.) hardly any significant features can be added to that of the basic level; whereas at the superordinate level, these conceptual similarities are hard to pinpoint. A picture of a chair is easy to draw (or visualize), but drawing furniture would be difficult.

Rosch (1978) defined the basic level as that level that has the highest degree of cue validity. Thus, a category like [animal] may have a prototypical member, but no cognitive visual representation. On the other hand, basic categories in [animal], i.e. [dog], [bird], [fish], are full of informational content and can easily be categorized in terms of Gestalt and semantic features.

The notion of prototypes is related to the (later) discomfort of Wittgenstein with the traditional notion of category. This influential theory has resulted in a view of semantic components more as possible rather than necessary contributors to the meaning of texts. His discussion on the category game is particularly incisive (Wittgenstein, 1953 Philosophical Investigations 66):

Consider for example the proceedings that we call `games'. I mean board games, card games, ball games, Olympic games, and so on. What is common to them all? Don't say, "There must be something common, or they would not be called `games' " - but look and see whether there is anything common to all. For if you look at them you will not see something common to all, but similarities, relationships, and a whole series of them at that. To repeat: don't think, but look! Look for example at board games, with their multifarious relationships. Now pass to card games; here you find many correspondences with the first group, but many common features drop out, and others appear. When we pass next to ball games, much that is common is retained, but much

is lost. Are they all `amusing'? Compare chess with noughts and crosses. Or is there always winning and losing, or competition between players? Think of patience. In ball games there is winning and losing; but when a child throws his ball at the wall and catches it again, this feature has disappeared. Look at the parts played by skill and luck; and at the difference between skill in chess and skill in tennis. Think now of games like ring-a-ring-a-roses; here is the element of amusement, but how many other characteristic features have disappeared! And we can go through the many, many other groups of games in the same way; can see how similarities crop up and disappear. And the result of this examination is: we see a complicated network of similarities overlapping and criss-crossing: sometimes overall similarities, sometimes similarities of detail.

Clearly, the notion of family resemblance is calling for a notion of conceptual distance, which is closely related to the idea of graded sets, but there are problems as well.

In the notion of game above, is there a single prototype or several? Linguistic data from color studies seem to indicate that categories may have more than one focal element; the Tsonga color term rihlaza refers to a green-blue continuum, but appears to have two prototypes, a focal blue, and a focal green. Thus, it is possible to have single categories with multiple, disconnected, prototypes, in which case they may constitute the intersection of several convex sets rather than a single one.

All around us, we find instances where objects like tall man or small elephant combine one or more categories. This was a problem for extensional semantics, where the semantics of a word such as red is to be defined as the set of objects having this property. Clearly, this does not apply so well to modifiers such as small; a small mouse is very different from a small elephant.

These combinations pose a lesser problem in terms of prototype theory. In situations involving adjectives (such as tall), one encounters the question of whether or not the prototype of [tall] is a six feet tall man, or a 400 foot skyscraper [Dirven and Taylor 1988]. The solution emerges by contextualizing the notion of prototype in terms of the object being modified. This extends even more radically in compounds such as red wine or red hair which are hardly red in the prototypical sense, but the red indicates merely a shift from the prototypical color of wine or hair respectively. This corresponds to Ferdinand de Saussure's notion of concepts as purely differential: non pas positivement par leurcontenu, maisnegativement par leurs rapports avec les autrestermes du systeme ("not positively, in terms of their content, but negatively by contrast with other terms in the same system").

Peter Gardenfors (Conceptual Spaces 2004) has elaborated a possible implementation to prototype theory in terms of multi-dimensional feature spaces, where a category is defined in terms of a conceptual distance. More central members of a category are "between" the peripheral members. He postulates that most natural categories exhibit a convexity in conceptual space, in that if x and y are elements of a category, and if z is between x and y, then z is also likely to belong to the category.

Thus, to understand how we form concepts about our world, which contains from the start naturally occurring things, it seems that prototype theory has much to offer.

Concept Mapping in Social Science

Concept Mapping

Social scientists have developed a number of methods and processes that might be useful in helping you to formulate a research project. I would include among these at least the following -- brainstorming, brainwriting, nominal group techniques, focus groups, affinity mapping, Delphi techniques, facet theory, and qualitative text analysis. Here, I'll show you a method that I have developed, called concept mapping, which is especially useful for research problem formulation.

Concept mapping is a general method that can be used to help any individual or group to describe their ideas about some topic in a pictorial form. There are several different types of methods that all currently go by names like "concept mapping", "mental mapping" or "concept webbing." All of them are similar in that they result in a picture of someone's ideas. But the kind of concept mapping I want to describe here is different in a number of important ways. First, it is primarily a group process and so it is especially well-suited for situations where teams or groups of stakeholders have to work together. The other methods work primarily with individuals. Second, it uses a very structured facilitated approach. There are specific steps that are followed by a trained facilitator in helping a group to articulate its ideas and understand them more clearly. Third, the core of concept mapping consists of several state-of-the-art multivariate statistical methods that analyze the input from all of the individuals and yields an aggregate group product. And fourth, the method requires the use of specialized computer programs that can handle the data from this type of process and accomplish the correct analysis and mapping procedures.

Although concept mapping is a general method, it is particularly useful for helping social researchers and research teams develop and detail ideas for research. And, it is especially valuable when researchers want to involve relevant stakeholder groups in the act of creating the research project. Although concept mapping is used for many purposes -- strategic planning, product development, market analysis, decision making, measurement development -- we concentrate here on its potential for helping researchers formulate their projects.

So what is concept mapping? Essentially, concept mapping is a structured process, focused on a topic or construct of interest, involving input from one or more participants, that produces an interpretable pictorial view (concept map) of their ideas and concepts and how these are interrelated. Concept mapping helps people to think more effectively as a group without losing their individuality. It helps groups to manage the complexity of their ideas without trivializing them or losing detail.

A concept mapping process involves six steps that can take place in a single day or can be spread out over weeks or months depending on the situation. The first step is the Preparation Step. There are three things done here. The facilitator of the mapping process works with the initiator(s) (i.e., whoever requests the process initially) to identify who the participants will be. A

mapping process can have hundreds or even thousands of stakeholders participating, although we usually have a relatively small group of between 10 and 20 stakeholders involved. Second, the initiator works with the stakeholders to develop the focus for the project. For instance, the group might decide to focus on defining a program or treatment. Or, they might choose to map all of the outcomes they might expect to see as a result. Finally, the group decides on an appropriate schedule for the mapping. In the Generation Step the stakeholders develop a large set of statements that address the focus. For instance, they might generate statements that describe all of the specific activities that will constitute a specific social program. Or, they might generate statements describing specific outcomes that might occur as a result of participating in a program. A wide variety of methods can be used to accomplish this including traditional brainstorming, brainwriting, nominal group techniques, focus groups, qualitative text analysis, and so on. The group can generate up to 200 statements in a concept mapping project. In theStructuring Step the participants do two things. First, each participant sorts the statements into piles of similar ones. Most times they do this by sorting a deck of cards that has one statement on each card. But they can also do this directly on a computer by dragging the statements into piles that they create. They can have as few or as many piles as they want. Each participant names each pile with a short descriptive label. Second, each participant rates each of the statements on some scale. Usually the statements are rated on a 1-to-5 scale for their relative importance, where a 1 means the statement is relatively unimportant compared to all the rest, a 3 means that it is moderately important, and a 5 means that it is extremely important. The Representation Step is where the analysis is done -- this is the process of taking the sort and rating input and "representing" it in map form. There are two major statistical analyses that are used. The first -- multidimensional scaling -- takes the sort data across all participants and develops the basic map where each statement is a point on the map and statements that were piled together by more people are closer to each other on the map. The second analysis -- cluster analysis -- takes the output of the multidimensional scaling (the point map) and partitions the map into groups of statements or ideas, into clusters. If the statements describe activities of a program, the clusters show how these can be grouped into logical groups of activities. If the statements are specific outcomes, the clusters might be viewed as outcome constructs or concepts. In the fifth step -- the Interpretation Step -- the facilitator works with the stakeholder group to help them develop their own labels and interpretations for the various maps. Finally, the Utilization Step involves using the maps to help address the original focus. On the program side, the maps can be used as a visual framework for operationalizing the program. on the outcome side, they can be used as the basis for developing measures and displaying results.

This is only a very basic introduction to concept mapping and its uses. If you want to find out more about this method, you might look at some of the articles I've written about concept mapping, including An Introduction to Concept Mapping, Concept Mapping: Soft Science or Hard Art?,or the article entitled Using Concept Mapping to Develop a Conceptual Framework of Staff's Views of a Supported Employment Program for Persons with Severe Mental Illness.

Instructional strategies for concept learning

Concept learning is one major learning type. While teaching simple concepts with clear instances is not that difficult, teaching concepts border cases is difficult, and teaching complex concepts remains a major challenge.
For many behaviorist instructional designers, concept learning has to be carefully planned to go from simple concrete concepts to complex composite ones.
At a lower level, concept learning can be measured by learner's classification behavior. Beginners can only identify similar examples; whereas more advanced learners (for a given subject) are able to transfer classification to a very different set of stimuli. Learning of complex concepts involves more that discrimination and transfer and may engage problem-solving processes. E.g. what Gagné calls "defined concepts" (such as "symmetry" as opposed to "circle", or "transport" as opposed to "horse", or "going out for food" as opposed to "eating an apple") do require more processing.
Instructional strategies for concept learning are:

Discrimination and identification of simple concepts

According to Alessi and Trollop (2001) a appropriate teaching design is to first teach relevant (essential) features, e.g. by stating a definition of the concept in terms of these features. Next simple instances are given and that contain all or many of the relevant features. E.g. for "mammal", we could show a horse, a dog and cow. At the same these example should not contain irrelevant or incidental features. In concept learning a concept all learners need to see examples and non-examples. Therefore in a next step non instances are shown, e.g. a tree, a bird and a fish for the "mammal" concept. These examples contain few relevant feature and many irrelevant and incidental features. Finally, the same procedure has to be applied to difficult instances and non-instances, e.g. show dolphins and whales for instances and sharks for non-instances.

II. Cooperative learning
Cooperative learning is learning in groups which are heterogeneous with respect to student characteristics and have two to six members sharing the various roles. Group members are interdependent in achieving the group learning goal. Members of cooperative groups learn from on another.
Advantages of cooperative learning
Interacting with one another produces cognitive as well as social complexity, creating more intellectual activity.
Cooperation increases positive feelings toward one another, reducing alienation and loneliness.
Cooperation increases self-esteem and social skills.
Increases ability to work together.

Major Feature

• Requires flexibility from teacher and classroom organization.

Process

1. Phase One: Encounter Puzzling Situation
2. Phase Two: Explore Reaction to Situation
3. Phase Three: Formulate and Organize the Study Task
4. Phase Four: Independent and Group Study
5. Phase Five: Analyze Progress and Process
6. Phase Six: Recycle Activity

Teacher must facilitate the group process.

III. Concept Attainment

This method uses inductive reasoning to develop a concept. Concept Attainment is an indirect instructional strategy that uses a structured inquiry process. It is based on the work of Jerome Bruner. In concept attainment, students figure out the attributes of a group or category that has already been formed by the teacher. To do so, students compare and contrast examples that contain the attributes of the concept with examples that do not contain those attributes. They then separate them into two groups. Concept attainment, then, is the search for and identification of attributes that can be used to distinguish examples of a given group or category from non-examples.

With carefully chosen examples, it is possible to use concept attainment to teach the concepts in the subject of social science.

Steps of Concept Attainment:

1. Select and define a concept
2. Select the attributes
3. Develop positive and negative examples
4. Introduce the process to the students
5. Present the examples and list the attributes
6. Develop a concept definition
7. Give additional examples
8. Discuss the process with the class
9. Evaluate

Advantages:

helps make connections between what students know and what they will be learning learn how to examine a concept from a number of perspectives learn how to sort out relevant information extends their knowledge of a concept by classifying more than one example of that concept students go beyond merely associating a key term with a definition concept is learned more thoroughly and retention is improved.

There are variations to presenting a concept attainment lesson, but generally it has the following components:

1. Describing the purpose of the lesson. (teacher)
2. Stating the rules of student interaction. (teacher).
3. Providing a focus statement to help students concentrate on a specific area. (teacher)
4. Presenting the examples in the form of objects, pictures, words, equations, or symbols. (teacher)
5. Defining the attributes of the examples. (students)
6. Testing the understanding of the concept. (teacher and students)
7. Labeling the concept. (students)
8. Debriefing or unpacking thoughts. (students)

Procedure of developing the concept of biodegradable items:

1. The teacher presents different kinds of waste items, one at a time, to the students by holding the objects up in front of the class or walking around the room. Students may touch the objects.
2. The teacher then places each item, as it is shown, on a table next to signs marked "yes" or "no". Items which are biodegradable are placed in the "yes" category and those that are not are placed in the "no" category. Alternate the placement of yes and no items and begin with only 3 or 4.
3. Students record the items in the appropriate column on the data sheet and try to determine the concept.
4.Initially, students should work independently (about 5 minutes). Students who know the concept should remain silent and write the answer on the data sheet and add their own examples to the "yes" category (Most students will not be sure or will be incorrect).
5.The teacher adds a few more (2 -3) examples to the tables.
6. Students then work with a partner to list and discuss the common attributes of the "yes" items. They combine their efforts to determine the concept.
7. The attributes of the "yes" items are discussed with the entire class and contrasted with the "no" items.
8.The teams then place the remaining items in the appropriate category and suggest additional items that could be placed on the "yes" table.
9. Following the analysis and testing for understanding of the attributes, a team states the concept.
10.Students describe their thought processes as they were solving the problem.

IV. Synectics

Use synectics to create new solutions to old problems by thinking outside of the box. Instructor leads the group by asking the students to:
Think of an object (problem) in a new way
Play with ideas
Encourage group activity with creativity

Purpose is to improve upon idea
This model is a way to involve all students in generating unique ways to solve a problem or develop a product. Use of analogies is the main ingredient when using synectics. Students should be encouraged to think metaphorically.
Major Features and Attributes
Uses metaphoric thinking (relationship of likeness) that draws from student prior knowledge of a subject to generate irrational thoughts
Major use of allegories and analogies. 3 types of analogies used are:
personal analogy - students shows empathy with problem or object
direct analogy – comparison of two objects or concepts
compressed conflict – two word description that conflict; oxymoron (tiredly aggressive, friendly foe)
Increases the creative capacity of students
Irrational thoughts and ideas and thoughts are okay but groups should make rational decisions.
V. Mastery Learning
Mastery of any subject is defined in terms of major objectives. The objective is then broken into sections or learning units with its own objectives. Each section objectives is tied into the major objective. Learning material is taught using an identified learning strategy. Students are assessed after each section. Reinforcement and feedback is given with praise and encouragement.
Major Features and Attributes
• Individually Prescribed Instruction (IPP) ensures students have more time and individual attention to complete learning material.
• IPP Benefits:
Students work at their own pace
Students can demonstrate mastery
Students develop self-initiation
Students learn how to solve problem
Encourage self-evaluation

VI. Direct Instruction
Direct instruction is the best method for training and academic settings. Teacher directs and controls the learning tasks. Student practice under the guidance of the instructor and independently.
Direct instruction has five phases of activity:
1. Orientation – Teacher provides objective of the lesson and the level of performance and describes content
2. Presentation – Teacher explains the new concept or skill and provides demonstration and gives examples
3. Structured Practice – Teacher leads students through practice examples
4. Guided Practice – Students practice on their own until they achieve 85-90% accuracy
5. Independent Practice – Reinforces the new learning to ensure retention

Major Features and Attributes

• Maximizes students learning time, time on task
• Improves student rate of success
• Include many practice exercises
• There are 6 levels of practice:

1. Independent Practice (i.e. homework)
2. Practice time should be short, intense, highly motivated practice
3. Monitor Initial Practice
4. Student must achieve 85-90% level of accuracy to move to next level
5. Students are given multiple practices over a period of time
6. Practice periods should be close together

VII. Simulations

With simulations, students play a role. Student develop new concept by completing tasks in the simulation. Simulators closely represent reality in a controlled environment.
Simulations are effective for teaching complex concepts. Simulations can be used to teach concepts such as how political, social, and economic systems work .

Advantage to simulators is:

1. Learning less complex than real world
2. Permits students to learn from self-generated feedback.

When using simulations the teacher will have four roles:

1. Explaining
2. Refereeing
3. Coaching
4. Discussion

Major Features and Attributes

· Elements of the real-world are simplified and presented in a form that can be contained in the classroom.
· Students learn from the consequences of their actions
· Simulations are part of the cybernetics principle (making an analogy between humans and machines).

Simulation model has four phases:

1. Orientation – Teacher presents model to be explored
2. Participant Training – Teacher sets simulation scenario for students
3. The Simulation
4. Debriefing – Describing event and
5. analyzing the process

Applications

Simulations are applicable to:

1. Competition
2. Cooperation
3. Empathy
4. Social System
5. Concepts
6. Skills
7. Efficacy
8. Paying the penalty
9. Role of chance
10. Think critically

VIII. Using questions to learn defined concepts

Higher-order questions, such as comprehension and analysis, support the learning of concepts more effectively than lower-order questions (Andre, 1979; Hamilton, 1985) and also demand greater attention from the learner.

IX. Presentation using Advance Organizers.

Presentation (or lecture) is among the most commonly used strategies for knowledge acquisition and retention. But presentation is more than teachers talking. An effective presentation requires a highly structured environment in which the teacher is an active presenter and students are active listeners and thinkers. Teachers use advance organizers - powerful concepts to which subordinate ideas and facts can be linked - to provide structure and then involve students in processing the new information.

The presentation strategy is grounded in information processing theory, which describes how learning occurs and how the mind organizes knowledge. The brain utilizes short-term memory for complex thought processes and long-term memory for information storage. Stored information is organized according to hierarchically ordered concepts and categories called cognitive structures. New information must be processed actively in short-term memory and tied to students' existing cognitive structures in long-term memory. Just as the mind has cognitive structures, every discipline has an organizational structure. Presentations should be organized around key ideas and structures and these structures should be made explicit to students.

Presentation enables teachers to organize and convey large amounts of information efficiently.

There are four phases in a presentation lesson.

1. In phase 1the teacher begins the presentation by explaining the goals, sequence, and expectations of the lesson, and by helping students retrieve appropriate prior knowledge.
2. In phase 2 the advance organizer is presented. Advance organizers are "scaffolds" that help learners link new information to what they already know. Advance organizers may be expository, comparative (relationships), or sequential (steps), and work best when accompanied by graphic or visual representations.

3. Phase 3 is the presentation itself. As new learning material is presented, the teacher pays particular attention to order and clarity, and provides concrete examples and illustrations that help students make required connections to what they already know.

4. In the final phase of a presentation, the teacher checks for student understanding and helps them integrate what they have learned. The teacher asks questions to encourage precise and critical thinking. Effective questions might involve asking for summaries, definitions, examples, comparisons, descriptions, analysis, or connections to the advance organizer. It is in this final phase that students integrate the new knowledge into their prior knowledge, build more complex cognitive structures, and develop understanding of complex relationships.

The teacher carefully structures the learning environment during a presentation so students can hear and see the presentation, uses procedures to ensure a smooth and effective pace, and addresses off-task behaviors immediately.

X. Discussion

Discussion is central to all aspects of teaching. Classroom discussion may serve as a strategy in itself or as part of another strategy. Teachers and students talking about academic content and students displaying their ideas and thinking processes to the teacher and to each other characterize discussions. Effective discussions go beyond question-and-answer recitations. The more involved students are in the discussion, the more effective the learning.

Discussion is an appropriate strategy for:

- improving student thinking; promoting engagement in academic content;
- learning communication and thinking skills in a social environment.

Discussion is particularly appropriate for topics that are subjective or controversial and that involve several points of view, such as the causes of World War I.

Classroom discussion proceeds through five phases.

- In phase1the teacher introduces the discussion by providing a clear purpose for the discussion and engaging students so they will become involved.
- This is followed by phase 2 where the teacher sets the ground rules, then poses a question, raises an issue, or presents a puzzling situation.
- Phase 3 is the discussion itself. The teacher asks questions, uses wait-time, responds to students' ideas, and enforces the ground rules. The teacher keeps the discussion focused and encourages all students to participate. Using visual cues and posting a written record of main ideas keeps the discussion focused. Skillful, well-planned questioning is critical, and each discussion should include a mixture of factual and thought-provoking questions. Pairing students or putting them in small groups can increase their participation during a discussion.
- The teacher provides closure in phase 4 by:
  - summarizing;
  - asking students to summarize the content and meaning of the discussion; and

- tying it back to the initial question or problem.
- Finally, the teacher debriefs the process of the discussion by having students examine their thinking processes and reflect on their participation.

- The teacher focuses and moderates the discussion, but broad and active student participation characterizes the learning environment. The atmosphere is one of open communication in which students feel free to express their ideas and ask questions. Teaching students to have high regard for other's ideas and to use interpersonal communication skills improves cognitive and social learning.

XI. Problem-based instruction

Problem-based instruction is the most student centered of the strategies presented. Students work actively and independently on problems that interest them. This requires an environment that is open and safe for asking questions, forming hypotheses, and sharing ideas. The teacher's role is to pose problems, ask questions, facilitate investigation and dialogue, and provide support for learning.

XII. Concept mapping

It is said that a picture is worth a thousand words. A concept map is a graphic representation of a network of concepts with links revealing patterns and relationships between the concepts.
Instructional strategies for successful concept development should encompass a variety of integrated approaches that are based on the individual's age and ability level. These strategies include encouraging the young children to explore their surroundings, labeling and describing their surroundings and the children's own actions, collaborating with other team members of the educational team, using appropriate conceptual terms, providing concrete experiences, using a variety of learning activities, and integrating instruction in concepts and skills.

Technology Integration: Planning with the iNtegrating Technology for inquiry (NTeQ) model for Social Sciences at secondary school level.

In the traditional classroom, the teacher is the sole source of all knowledge. The teacher is the "sage on stage," standing in the front of the classroom and imparting her knowledge, mostly a steady stream of facts. The role of the the constructivist teacher is "the guide on the side." She plays a supporting role in the classroom, choosing topics and setting goals, but allowing students to decide how to reach those goals and create their own learning priorities.

Student interaction

In the traditional classroom, students have little or no interaction with each other. All discourse flows from the teacher. Students sit in rows facing the teacher and the blackboard. Students listen

to the teacher and take notes or do workbook exercises as instructed. In a constructivist class, students are more likely to sit at tables and face each other. There is a great deal of interaction between students as they work in groups in order to complete assignments.

History

A traditional history class emphasizes people, places and dates. The teacher and the textbook tell students which facts are important enough to memorize. A test, most likely multiple choice, measures their success at memorizing those facts. A constructivist history class, on the other hand, begins with a discussion among students, who formulate their own questions about the past. The opening questions, such as "How did Colonial restrooms work?,"may appear to be trivial, but they lead to further study and research into more profound questions about colonial city planning and sanitation.

Science

A traditional science class starts with a textbook and a teacher who emphasizes and explains certain aspects of the textbook. Students memorize whatever the teacher points them toward --- physics formulae or the periodic table, for example. In a constructivist science class, the lesson is opened with concepts students are already familiar with, such as weight. The teacher gives students a balancing scale and some clay and asks them to create their own system of weight measurements. Students will extend their previous notions of weight and balance, eventually seeing their central role throughout science.

E-class

Hopefully, we have come a long way from the early fears that computers would replace teachers to a view of how teachers and students can take advantage of the computational power of the computer to learn in new ways. We realize that the technology changes almost daily and it seems nearly impossible for anyone under the age of 22 to keep abreast of all the changes. However, the teaching environment is changing. Before the introduction of the Internet to the classroom, the class was defined by a textbook and the four walls. Today, there are no boundaries as the World Wide Web is massive data base of information that students can access faster than most teachers can redirect a question. Ten years ago, the teacher was the expert in the classroom. Today, an expert around the world is readily available to your students. The role of the successful teacher changes from that of expert to one who is wise. The wise teacher realizes that he or she is not the expert, but knows how to capitalize on the resources that are readily available. These include not only the scholarly expertise available on the Web, but also the technological expertise of the students. Our goal in this textbook is to create wise teachers who can facilitate learning by managing the resources and classroom.

The type of computer you have does not matter. All your students need is access to integrated software such as AppleWorks, Microsoft Works, Microsoft Office, or individual applications for spreadsheets, databases, word processing, drawing, presentations, and Internet browsing. We have observed teachers who have collected the older Macintoshes and PCs that were discarded by other teachers, parents, or businesses . They were able to provide almost large number of computers in their classrooms that worked well with this approach. How many of us really need a computer with a 2.2 gigahertz processor when we can barely type 50 words a minute! This book is written for the pre-service and practicing teacher who has very basic computer skills such as using a mouse; opening, creating, and saving documents; and using menus. The software is not as important as learning how to use the tool in a productive manner to learn core content and skills. The type and capability of the software you use in your classroom will most likely change, and some programs will be replaced by more powerful software in a year or two. Because you and your students will know how to use word processing, databases, spreadsheets, and the Internet, the brand name and version will no longer matter.

Philosophy and Approach

In contrast to the drill-and-practice instruction employed in the traditional classroom, the NTeQ model embraces the computer as a tool for problem-solving. Students leverage the computer to do research, organize information and generate and present solutions to problems. Students also collaborate in small groups as opposed to working independently on computer tutorials. This instructional process mirrors problem-solving in professional arenas, such as business and science.

How Students Learn

In traditional classrooms, students have a passive role. They perch at desks, heed the teacher and take notes. In an NTeQ classroom, students actively engage with the lesson's subject matter. By assuming the role of researcher, students remain accountable for solutions to problems. Instead of teacher-dictated prioritization of material, students in an NTeQ environment determine the importance of information in their investigation, according to the Governor's School for Government & International Studies website. Students also become competent in various applications of technology, such as databases, spreadsheets, presentation software and word processing and web-based tools.

How Teachers Instruct

In a traditional classroom, teachers need only rudimentary computer skills. But with NTeQ, teachers must grasp the computer as a learning tool. They must be able to apply their expertise on computer functionality to design, facilitate and supervise a diverse educational environment. In the role of designer, teachers must incorporate computer applications into their lesson plans; they need to figure out what the student is doing, not only on the computer but also before and after using the machine. Teachers guide students on a wide variety of digital resources. They should demonstrate task-specific applications, such as inputting information into a database.

Teachers also need to manage classroom computer use, establishing rotation schedules and rules of computer maintenance.

Role of the Computer

Computers are used in the traditional classroom to supplement learning activities, such as using word processing programs to type papers or graphics programs to model geometric shapes. Although the computer serves to accelerate the completion of tasks that were previously time-consuming when done by hand, it is only an appendage. Children also use computers in traditional classroom environments for recreation, such as playing computer games or chatting via instant messaging applications. In an NTeQ classroom, however, the computer transforms into a learning tool and becomes an extension of the mind. Students use the computer to do research, vet information and consider and solve the problems at hand.

UNIT - IV: Evaluating and assessing student learning (08 hours)

- Evaluation: Concept, importance and Types of Evaluation. Concept of Comprehensive and Continuous Evaluation.
- Type of Test items and development of achievement test in social sciences.
- Diagnostic testing and remedial measures.

Evaluation: Concept, importance and Types of Evaluation. Concept of Comprehensive and Continuous Evaluation.

Introduction

Numerous people are involved in some way in introducing learning technology into teaching, whether in acquiring and using some software developed elsewhere or in authoring new software. Having put in considerable effort during a project, we generally wish (or are required by others) to be able to show something about the results. Simply delivering the software on a disk is seldom felt to be enough: what can we do to pull together and present further evidence?

I shall refer to all such further evidence as "evaluation", and to the teaching material being evaluated as "courseware". In principle the same issues apply to all teaching methods from lectures and textbooks to computer software, multimedia, and advanced telecommunications. My views have grown from work in higher education, but may well apply in other areas of education. In what follows I offer an introduction to the basic issues of evaluating courseware in higher education, and an overview of some useful distinctions.

The simplest evidence is to list the functions of the software, or to list the number of people who bought or used the software. Such evidence is weak however because purchase, acquisition, and use depend as much on opportunity, available money, and advertising as on the quality of the courseware. Better evidence comes from inquiring about the effects, and there is a great range of methods to choose from: from asking informally how the teacher felt it went, to running a big controlled experiment.

What is the question?

As many writings and "methods" of evaluation say, the apparently obvious place to begin is with identifying the goal or purpose of evaluation: if you don't have a question you don't know what to do (to observe or measure), if you do then that tells you how to design the study. Many studies begin with questions like "Do the students learn more with the new software?". But you must ask yourself whether you are sure the question given is the right question. After all, many questions are not. You could ask what colour a lecture was, bring in a spectroscope and take measurements during a lecture, but none of that would make the question sensible or get over the false presupposition that lectures have a colour. Similarly many people have talked as if "are computers good for learning?" was a sensible question, even though they would probably not have asked "are books good for learning?". Only if you are sure you know what the question is, that it is sensible, and that no surprises are possible, is it safe to base a study simply on making measurements that answer the given question. That is why including open-ended observations and questions is so important as part of most studies.

On the other hand, it is seldom helpful to approach a study with a blank mind. One place people go to for help is experts. Among other things, expertise gives a person experience of what the important issues and questions are likely to be. Every past problem can be turned into a question to check in the future, although of course there is no guarantee that new problems will not emerge in new projects. Machell& Saunders (1991) in fact is basically a large, structured collection of questions, and novices to the field of evaluation find this very useful as a way of getting started. However it is important to recognise the present (and probably permanent) state of the field of education: no-one has a precise predictive theory of teaching or learning. Experts' experience allow their estimates to be of more value than novices, but it is not very accurate all the same. This has two consequences: that you must continue to ask whether your question is the right one and to make open-ended observations that may alert you to unforeseen issues, and that estimates, no matter how expert, are not going to be as accurate as actual measurements i.e. observing real students learning will always be more informative than consulting teachers and other experts, although it is usually more difficult and expensive. (Note that education is not so different from a lot of engineering in this respect: that is why testing is so important a part of most engineering projects, despite the expense.)

Planning and resource constraints

As with very many activities, no amount of expenditure guarantees getting what you really want, yet better quality results do require more resources. The maximum quality of the evaluation in many projects, and hence the quality of the lessons they can leave behind, and hence the long term usefulness of the projects as a whole, is effectively limited when they are set up. If time, money, and the skills for evaluation brought by hiring appropriate people, are not planned for and funded, then the outcomes are limited.

Yet planning is perhaps a more important limitation: provided evaluation is planned for from the start and kept high on the agenda, then useful results with modest resources are attainable. But without planning and management that keeps evaluation a high priority, it will not happen: evaluation cannot be effectively tacked on as an afterthought like writing an extra project report. This is most evident with projects centred on creating new materials. If testing and evaluation are not planned for as essential, then as the end of the project looms it is a rush to get any version at all finished, and the software will never be tested on learners. The chances of it being satisfactory are about the same as those of a pedestrian walking across a motorway without injury, because we just cannot predict accurately whether and when students will learn. In fact such miracles have occurred, but few would conclude that that shows the procedure to be reasonable. Learners behave like motorists in such cases, and will avoid a disaster caused by others if they can: they will probably be very angry at having to work round the design faults, but since they want to learn they will do so even if it means going to the library afterwards to compensate for the deficiencies of the courseware.

Allowing for testing is crucial, and even if relatively little time and money is spent on it, planning for it is crucial so that a working version of the software is ready in time: and that time is often determined by the availability of suitable test subjects. Furthermore, in development projects, more time after the test must be allowed for in which modifications suggested by the tests can be made. These are often not very lengthy to make, but they must be allowed for at the planning stage. Useful evaluation leads to action, therefore evaluation is largely wasted if it is done too late to make changes.

Planning at the project level, then, is the most important requirement. This is not only true in development projects, but also in projects centred on introducing courseware that is already finished. Here, evaluation will revolve around classroom trials, and these in turn are constrained by the availability of classes for the trials: often once a year at a time determined by the institution and not the project.

The main issues

Given at least some resources, and that planning was done in time, what might an evaluation consist of? The choices are enormous, and many of them are laid out in the references cited below. However there are perhaps two dimensions that turn out to be most important in understanding the space of choices.

Opinion, memory, and observation

The most convenient method for an evaluator is to ask someone else, preferably an expert, for a judgement. This is what journalists do almost entirely. It is obviously better than just recording their own opinions. However the opinions of (possibly interested) onlookers is not as informative as that of the learners themselves: that is why it is becoming standard practice to use student feedback questionnaires in teaching, rather than the teacher's own opinion of their performance, even though teachers are often aware of their own major strengths and weaknesses. However asking someone (a learner) retrospectively about a teaching episode, which is what all questionnaires do, is not nearly as informative as gathering on the spot information as it happens; although the difference in quality depends strongly on what is being asked about. For instance, when we ask students to tell us how long they spent on each learning resource (how long on an exercise, how long looking at the textbook) they have a lot of difficulty and are almost certainly very inaccurate. Similarly if you ask students to write down the worst feature of a piece of courseware, they can do this, but if you ask them to tell you about every problem they will forget most unless you ask them as they go along, when you will get perhaps five times as much information (at a cost of course, particularly to the student). This is because memory is much inferior to on the spot observation and recording. Questionnaires and interviews rely on memory and are therefore less valuable than on the spot observation, and the longer after the event they are, the less valuable they are.

Similarly an "experts' " opinion is less valuable than that of a teacher who has tried the materials on students, and a teacher's opinion is less valuable than those of actual learners. Learner's opinions however are often less trustworthy than behavioural tests (e.g. assessment scores): for instance men generally feel and express more confidence about what they have learned than women, while scoring no better on tests of what they actually learned. Again, cost and convenience run largely in the opposite direction (it is easier to ask opinions than to set and mark tests), and in practice a compromise must be decided.

In summary, although costs and opportunities may not often allow optimal methods, it is in general best to base evaluation on actual learning by representative students who really want to learn (not the opinions of onlookers or the performance of special subjects brought in for a trial); to test what they actually did learn, rather than asking whether they felt they learned; and if possible to observe them as they try to learn, and pick up as many observations from them as possible. Of course this is itself disruptive, and must often be avoided. The trade-off here will be between getting the most useful information pointing to what changes to make to a design, and getting the most representative overall results. A development project might do well to decide to run some tests in a relatively disruptive mode as early as possible, and having refined the design run less disruptive tests to obtain evidence of final performance. Personal observation and interviewing gives better information than questionnaires, but on the other hand realistic classroom trials usually have all students learning at the same time, so questionnaires may be a sensible compromise in order to get data from the whole class with only one or two investigators.

Systematic surveys vs. surprise detection

The other major issue is that of the need for both answering systematically questions we are interested in in advance e.g. did all students learn the material up to some criterion, and detecting unexpected problems and issues. An analogy with visual perception may be useful. One thing that perception does is support specific tasks such as checking whether a particular friend's car drives past you: you scan all cars, make sure you don't miss any, and without bothering about irrelevant attributes of the cars e.g. how dirty they are, whether hub caps are missing, look at the identifying features (perhaps the registration number, or the colour and size). Another thing perception does however is allow you to notice completely unexpected things, such as a tiger walking down the street towards you, someone's umbrella which is just about to poke your eye out, or a street vendor offering venison which would do nicely for your dinner. It will do these things even though you did not plan to do them, and could not say that, for instance, you noticed everything on sale by street vendors.

Similarly with evaluation: it is important to cover both functions. Methods such as exam-type tests and questionnaires with fixed response categories will never warn you that something you did not anticipate is in fact important in the situation you are studying. Hence it is vital always to have some open-ended questions and preferably personal observation by the evaluator. In fact if at all possible it is best to run two studies, so that issues thrown up by the open-ended measures in the first can be used to do systematic surveys in the second. In this way, you can discover whether the 2 students who mentioned that the screens were hard to read in bright light were unusual, or in fact represented an issue that worried all the students. As this example shows, however, open-ended questions and observations are not a substitute for fixed questions: only by putting the same question or task to each learner and requiring the answers to be expressed using the same categories (or marked using the same coding or marking scheme) can you get comparative results that allow you to discover and report results such as what proportion of learners were affected by an issue.

Any evaluation study, then, should have both open-ended measures for detecting surprises, and fixed measures for generating comparative data that can answer specific questions. Without fixed measures you may not be able to say anything definite about the courseware: only an unstructured set of observations and opinions from individuals, which may or may not be shared by the other learners. Without open-ended measures you have no chance of detecting problems or anything you did not think of in advance, and it is from the unexpected that most important improvements stem.

Four types of evaluation classified by aim

When we consider possible approaches to educational evaluation, there are four general types described in the literature. We describe them in turn. They are not wholly mutually exclusive, but distinguishing them may be helpful before they are combined in individual cases.

Evaluation of LT materials/CAL (computer assisted learning) is in fact intimately linked with the authoring and dissemination process. Thus approaches to evaluation reflect either what the authoring process seems to be before evaluation is considered, or else what the evaluators think it ought to be in order to make evaluation useful. Another way of putting this is that evaluation can be designed for different purposes or roles:

Formative evaluation: to help improve the design of the CAL
Summative evaluation: to help users choose which piece of CAL to use and for what.
Illuminative evaluation: to uncover the important factors latent in a particular situation of use.
Integrative evaluation: to help users make the most of a given piece of CAL.
As far as I know the terms, though perhaps not the ideas, were introduced as follows: "formative" and "summative" by Scriven (1967) (see also Carroll &Rosson (1995) for their subsequent use in Human Computer Interaction); "illuminative" by Parlett& Hamilton (1972/77/87); "integrative" by Draper et al. (1996).

The consumer view: summative evaluation

The default "common-sense" view that tends to occur spontaneously to many people is that evaluation of CAL is rather like consumer reports on goods: the manufacturer designs and supplies them, then someone else does tests and produces reports to help purchasers decide which to buy. This view of evaluation is linked to a view that CAL is produced like textbooks and other goods, and that evaluation is not expected to have any direct effect on the CAL itself by telling the authors how to improve it. Nor is it expected to help consumers in how to use the product: only which to buy. Thus this is a common view for perhaps these reasons: it fits the fact that a lot of CAL is produced like a lot of textbooks by a very small team of authors with no spare resources for testing; it fits with a tradition in the literature for comparative experimental testing (which can compare two sets of teaching materials well); it fits the needs of new CAL users to decide what to buy; and more broadly it is analogous to consumer reports and how we encounter most of the things we buy, which we are offered without being consulted about how we would like them designed.

Formative evaluation
One important use of evaluation is while it is being developed: testing it on learners while there are still resources for modifying it. This is the simplest way for evaluation to help authors (developers); to try out the CAL material on users, preferably as similar as possible to the students it is intended for, and use open-ended methods to report the problems that arise and perhaps also to suggest amendments. Although often the time necessary for this is not allowed

for in development plans, once a developer has experience of it, it is usually clear how useful this is. After all, testing is part of all engineering, and feedback from students is also used by almost all lecturers to adjust their lectures and handouts. The key point to realise when using it for CAL, is that such testing must be done in time to allow changes to the material in the light of the results before the end of the development period. This kind of testing is called formative evaluation, as it is used to modify ("form") the material.

The most realistic, and so most helpful, formative evaluation would use real students in their normal learning situation. This is likely to increase the time for the whole cycle of production, testing, and modification. Feedback to developers from sites who are early users of the material is a helpful substitute that gets round this constraint. Although this practice really means that users are running poorly tested software, and in effect doing the testing that producers should have done themselves, it is better than having no way of catching problems and improving the software. It, in fact, corresponds to common processes in commercial software production, where producers keep track of users and collect performance reports in order to improve later releases of their software.

More information on planning this kind of evaluation can be found in Alessi&Trollip (1991), and in McAteer& Shaw (1994). As noted above the key constraint is planning to do the testing early enough that changes can be made. The reward is a significant improvement in quality of the end product. Thus the main added result will not be a report, but the modifications to the design actually done.

Illuminative evaluation

"Illuminative evaluation" refers to what might now be called loosely, and perhaps incorrectly, ethnography. The basic idea is for the investigator to hang out with the participants (students, teachers, etc.) to pick up how they think and feel about the situation, and what the important underlying issues are. For a more precise view and examples see Parlett& Hamilton (1972/77/87) and Parlett&Dearden (1977). Its importance is as an open-ended method that can detect what the important issues are, without which other methods often ask the wrong questions and measure the wrong things. For instance most studies still fail to measure motivation in any way, yet much CAL would never be used if it were not made compulsory by teachers or experimenters. However this is not a universal truth: in some cases students have a strong desire to use the CAL independent of coercion, in others they are indifferent and use it only under compulsion but without disliking it, in yet others they continue to express strong revulsion (even though educational tests show educational benefits).

Another even simpler example concerns lectures: providing handouts and using slides were intended to augment the voice medium and make things easier for students, but it turned out from informants that this created a new problem for students of discovering from moment to

moment what the connection between the three channels was (e.g. was the current slide on the handout or did they need to write it down?). Simply measuring the effectiveness of using the extra channels might have shown a reduced rather than an increased benefit, but without giving any clue about what the problem was. Illuminative evaluation is in effect a systematic focus on discovering the unexpected, using approaches inspired by anthropology rather than psychology.

TILT's "integrative" evaluation

The TILT project at Glasgow University has done many classroom studies of CAL. The kind of study they have concentrated on is of the real use of CAL as part of university courses, but with evaluators who can gather more and fuller information than a teacher alone can do through student verbal questions and standard course feedback questionnaires. They have begun to argue that these evaluations serve a rather different purpose than was first envisaged. They argue that for many teachers in practice, the question is no longer whether to use CAL or which package to use: this has often been decided already. Instead, for them the question is how to make the best use of CAL material they are already committed to using. Classroom evaluations typically give lots of information that can be used for this. For instance if all students complain about some issue, or score badly on a quiz item corresponding to an issue, then teachers immediately respond to the evaluation report by adjusting in some way e.g. making an extra announcement, or producing a supplementary handout. Thus a major use of classroom evaluations in practice is to be formative, not of the CAL itself, but of the overall teaching and learning situation. This of course can be and is responsive to local variations in how the CAL is used, and for whom. It can be a significant help in integrating CAL material into varying local situations and courses: Draper et al. (1996).

Approaches to method

The methods you use and questions you ask will depend partly on what you hope to use the evaluation results for (see previous section) and partly on your views about methods.

Checklist approach

Machell& Saunders (1991) offers a structured approach to dentifying the questions you are interested in from within a large space of possible concerns, pulling them together, and so perhaps generating a questionnaire for learners or a checklist for course organisers. This would lead to a report on courseware based on the pre-existing concerns of the evaluator, and largely relying on (memory for) experience of the courseware and its use.

What the participants feel

An alternative approach is not to rely on what the evaluator thinks, but to ask learners what they feel. A rather trivial form of this is common, in which a simple questionnaire asks learners whether they liked using the courseware - the "how was it for you?" approach. The problem with this is that it asks for opinions about enjoyment instead of measuring actual learning, and such feelings are strongly influenced by many things other than learning such as novelty or a desire to be polite to a concerned teacher. At the other extreme is a careful "illuminative" approach that identifies all the stakeholders (those affected by the courseware) and uses participant observation and in depth interviews rather than a short questionnaire. Parlett&Dearden (1977) and Murphy & Torrance (1987) illustrate work of this kind. In designing evaluations it may be best to avoid both ignoring and relying wholly on measurements of feeling: open ended observation of some kind, as argued above, is a crucial component of any evaluation; and learners' enjoyment and feelings are outcomes that it is as well to measure among others.

Addressing the whole situation

Courseware is generally only of interest if it promotes learning. However to the extent that it does, it only does so in conjunction with the wider teaching context in which it is used: how it is supported by handouts, books, compulsory assessment, whether the teacher seems enthusiastic about it, support among learners as a peer group, and many other factors. Major implications for evaluation follow from this. It is not possible to evaluate courseware by itself: you can only evaluate its effect together with that of the surrounding support it had in the situation studied. Evaluation must cover not just the courseware but the way and the situation in which it is delivered; and the results may only apply to that specific case.

Draper et al. (1994) is a rather pessimistic development of this point, concerned more with problems than solutions, but it does focus on the issues involved in looking at what actually determines learning in practice rather than only those issues most directly controlled by developers and distributors. In this it is in line with the emphasis above on the need for open-ended measures as well as systematic ones in order to detect issues that were not anticipated by the evaluator but which are important for how the courseware fares in practice.

However a focus on the specificity of the case can be a virtue: it allows evaluation to support teachers in getting the best out of a piece of courseware by optimising its integration into the particular local delivery situation. Although logically such reports do not tell you how the courseware would perform in other situations, building up a set of such detailed case studies complete with how successful they were and what teachers did to make them successful locally is obviously helpful information for other prospective users. Furthermore it accumulates information for teachers on how to use the courseware, which is still too seldom provided by the developers.

The experimental approach

The fourth, and grandest, kind of method is the experimental one. Here some educational intervention (such as a piece of courseware) will typically be tested by a direct comparison of its performance against that of some reasonable alternative (such as the traditional teaching it replaces). Educational journals have many examples of this approach to evaluation for research purposes.

This approach has two important characteristics. Firstly it is usually very expensive in time and researcher effort. A simple experiment comparing the performance of some new educational intervention against an alternative often consumes one or two person-years of research, without counting the input of teachers and other research colleagues. This may be worth it to establish a new idea or theory, but not just to test one of the growing flood of new pieces of courseware. Secondly, any such experiment taken in isolation is open to all the criticisms sketched above that the learning outcomes in fact depend on many other factors besides the intervention being tested, many of which cannot be effectively controlled e.g. the enthusiasm the teachers and students feel about the methods being compared. Furthermore we are too ignorant of what these factors are to have any confidence that they are controlled in any experiment. Such experiments can be taken as establishing that it is now reasonable to take the new intervention seriously having performed well in one real test, but can seldom be taken as proof that it is inherently better or even necessarily effective by itself.

More comprehensive approaches

Above four roles for evaluation were introduced. However, in practice more than one kind of evaluation can and should be done. Firstly, work done for one purpose may turn out useful for another (Draper et al.; 1996). Secondly, different types are appropriate at different stages in the development of an educational intervention (Scriven; 1967, Carroll &Rosson; 1995). In general, evaluation of one kind or another is useful before, during, and after development; and in well designed projects different kinds of evaluation should be done at different stages. One scheme for this has been developed by Diana Laurillard.

Laurillard's evaluation programmez

Recently Diana Laurillard has presented a much more elaborate scheme for evaluation in various talks. In this approach, production stretches over years, and different evaluation techniques are used at different stages. For instance, before design begins a "phenomenographic" study (Marton; 1981) would be done of the main problems students experience in learning the topic from existing materials. This can identify both the starting point of students, and the main problems they are likely to encounter: essentially a pre-design analysis of needs. Evaluation in this approach continues through to full classroom trials of the CAL material used in the way specified by the developers.

In a talk in Nov. 1994, Laurillard outlined the following evaluation programme:

Pre-program design: Curriculum needs, Learning needs (phenomenographic study), Student access.
Prototyping: Observation, Comparative trials
Formative evaluation: Observation, Pre/post tests, interviews, monitoring, questionnaires
Piloting: Observation, interviews, questionnaires
Summative evaluation: Questionnaires, interviews, tests, documentation This method seems a good match for how the Open University teach courses, and also the larger packages produced by TLTP subject consortia for large classes of students in the first year. It seems unlikely to suit the development of CAL for final year options, where a long experience of teaching the topic does not exist, and the final number of students even nationally is unlikely to justify a big development effort. It also seems to ignore the widespread requirement to adapt CAL materials to local needs, where each application will be different and require separate evaluations that cannot be simply compared. This is because any classroom evaluation is really measuring the effect of the CAL material combined with all other components of the local situation e.g. announcements, integration with the rest of the course, etc. As conditions and indeed aims vary across institutions, so results will vary. Hence I would argue firstly for extending the above programme by a sixth step:
Integrative evaluation: tests, confidence logs, resource questionnaires (Brown et al.; 1996).

Concept of Comprehensive and Continuous Evaluation

Continuous and comprehensive evaluation is an education system newly introduced by Central Board of Secondary Education in India, for students of sixth to tenth grades. The main aim of CCE is to evaluate every aspect of the child during their presence at the school. This is believed to help reduce the pressure on the child during/before examinations as the student will have to sit for multiple tests throughout the year, of which no test or the syllabus covered will be repeated at the end of the year, whatsoever. The CCE method is claimed to bring enormous changes from the traditional chalk and talk method of teaching provided it is implemented accurately.

New scheme of evaluation
As a part of this new system, student's marks will be replaced by grades which will be evaluated through a series of curricular and extra-curricular evaluations along with academics. The aim is to reduce the workload on students and to improve the overall skill and ability of the student by means of evaluation of other activities. Grades are awarded to students based on work experience skills, dexterity, innovation, steadiness, teamwork, public speaking, behavior, etc. to evaluate and present an overall measure of the student's ability. This helps the students who are not good in academics to show their talent in other fields such as arts, humanities, sports, music, athletics, etc.

Marks and grades

In CCE, the marks obtained in an exam are usually not revealed. However, equivalent grades, which would be deduced using a special method by the teachers during evaluation would be revealed. This is considered as a drawback since a child with 92 marks will get the same grade as the child with 100 marks and their talents cannot be recognized by anyone else other than their teachers. Though this system might have some drawbacks it instills this value that students need to compete with themselves to get a better grade and not with others.

Pattern of Education

Unlike CBSE's old pattern of only one test at the end of the academic year, the CCE conducts several. There are two different types of tests. Namely, the formative and the summative. Formative tests will comprise the student's work at class and home, the student's performance in oral tests and quizzes and the quality of the projects or assignments submitted by the child. Formative tests will be conducted four times in an academic sesssion, and they will carry a 40% weightage for the aggregate. In some schools, an additional written test is conducted instead of multiple oral tests. However, at-least one oral test is conducted.

The summative asssesssment is a three-hour long written test conducted twice an year. The first summative or Summative Assessment 1 (SA-1) will be conducted after the first two formatives are completed. The second (SA-2) will be conducted after the next two formatives. Each summative will carry a 30% weightage and both together will carry a 60% weightage for the aggregate. The summative assessment will be conducted by the schools itself. However, the question papers will be partially prepared by the CBSE and evaluation of the answer sheets is also strictly monitored by the CBSE. Once completed, the syllabus of one summative will not be repeated in the next. A student will have to concentrate on totally new topics for the next summative.

At the end of the year, the CBSE processes the result by adding the formative score to the summative score, i.e. 40% + 60% = 100%. Depending upon the percentage obtained, the board will deduce the CGPA and thereby deduce the grade obtained. In addition to the summative assessment, the board will offer an optional online aptitude test that may also be used as a tool along with the grades obtained in the CCE to help students to decide the choice of subjects in further studies. The board has also instructed the schools to prepare the report card and it will be duly signed by the principal, the student and the Board official.

Often during the evaluation of Social Science papers, the following concepts are observed.

Investigation of the situation - What is the question and what is to be explained.

Deductive Method - What does the student know and how can he use it to explain a situation.

Co-relation with a real life situation - Whether the situation given matches any real life situation, like tsunamis, floods, tropical cyclones, etc.

Usage of Information Technology - Can the problem be solved with the use of IT? If yes, how?

In addition to that, various assignments can be given such as projects, models and charts, group work, worksheet, survey, seminar, etc. The teacher will also play a major role. For example, they give remedial help, maintain a term-wise record and checklists, etc.

Type of Test items and development of achievement test in social sciences

Achievement Tests

Designed to measure what you already know.

In 1962, the Scholastic Aptitude Test replaced the essay test used by the College Entrance Examination Board.

This test, and the advent of machine scoring led to a rapid increase in the use of standardized achievement tests in the U.S.

Achievement testing serves many purposes :

1. Assess level of competence
2. Diagnose strength and weaknesses
3. Assign Grades
4. Achieve Certification or Promotion
5. Advanced Placement/College Credit Exams
6. Curriculum Evaluation
7. Accountability
8. Informational Purposes

Differences in Approaches to Achievement Testing

The information gained from a standardized test is dependent upon how the testing is incorporated into the learning material.

Summative Evaluation : Testing is done at the end of the instructional unit. The test score is seen as the summation of all knowledge learned during a particular subject unit.

Formative Evaluation : Testing occurs constantly with learning so that teachers can evaluate the effectiveness of teaching methods along with the assessment of students' abilities.

Standardized Achievement tests can be:

- Norm-Referenced
- Criterion Referenced

The National Assessment of Educational Progress

This organization is dedicated to improving the effectiveness of our schools

In order to accomplish this goal, they make objective information concerning scholastic performance available to educators and public policy officials.

They use a criterion-referenced approach to evaluating performance in ten subject areas, which are age stratified in four groups : at age 9,13,17, and 25-35.

10 subject areas they develop criterion reference:

- Art
- Occupational Development
- Citizenship
- Literature
- Math
- Music
- Reading
- Science
- History
- Writing

The criterions they set can be used as guidelines to evaluate the effectiveness of the educational system within a particular area by comparing the performance to the national criterion levels.

Types of Standardized Achievement Tests

4 major Categories

Survey Test Batteries : Commonly used to determine general standing with respect to group performance. He battery is a group of subject area tests, usually containing a fairly limited sample of questions with in each subject area.
Test batteries usually have lower reliabilities than single subject survey tests bc of the limited question sample of each subject area.

Single Subject Survey Tests : Longer and more detailed than batteries, but only one subject are is covered by the test. Greater sampling of questions means higher levels of reliability than survey batteries.

Diagnostic Tests: Allows for the identification of specific strengths and weaknesses within a subject area by subdividing the subject area into the underlying components. Diagnostic tests are common in the areas of reading, mathematics, spelling, and foreign languages are most common.

Prognostic Tests : Aptitude tests which are designed to predict achievement in specific school subjects.
Criticisms of College Entrance Examinations

1. Preparation for college entrance exams takes up time previously devoted to learning.

2. Multiple Choice questions are inherently biased bcthey :

A. Favor Shrewd, nimble witted rapid readers.

B. Penalize creative, more profound thinkers

C. Concerned with only the answer, not how the person came up with the answer.

(Banesh Hoffman, 1962)
D. Encourage Improper study habits such as rote memorization

Criticism of Educational Testing Service (ETS)

ETS came under fire in the 1980's by Raplph Nader, a perpetual candidate for the presidency and a consumer advocate.

Nader criticized the SAT's and ACT's for not measuring imagination, idealism, determination, and other abilities which he considered important in quantifying human qualities.

Allan Niarn (1980), a collegue of Nader's claimed that the SAT's measure Social Class, rather than educational aptitude.

Nairn claims the ETS is trying to suppress this information, bc the evil purpose behind the SAT is to maintain the status quo of society and to deny opportunity to those of lower socio economic status.

Nairn claims that since the SAT is a poor p[redicotr of college grades, a different measure of assessment should be developed.

ETS responded to these highly publicized attacks by claiming the SAT does not deny access to higher education for individuals from working class and poor families.

The National Center for Fair and Open Testing
Fairest

Continued the attacks made by Nairn by claiming the SAT is biased against minority groups and women, and therefore deny them an equal opportunity for higher education.

They also criticized the use of "experimental" sections of the SAT which were not used for grading purposes.

New York State has a "truth in testing" law which requires all test takers be given copies of their own answer sheet, and informed how test scores will be computed. In addition, test developers must file information concerning the validity of the standardized measure with the State commission of Education

The ETS claims that careful internal review of all potential test items has resulted in removing bias within an item which would adversely affect scores of women and/or minorities.

Another concern of Standardized Testing

How much can coaching affect scores?

If scores are significantly affected by Kaplan seminars or other preparation methods, how reliable are these standardized tests?

To the degree that people with more disposable resources (higher SES) are more likely to take advantage of these programs, is a class bias being created that affects the interpretation of the test scores?

Studies designed to measure the effectiveness of these testing seminars has produced mixed results :

College Entrance Examination Board (1971) : Claimed there was no evidence thatshort -term, intensive drilling on SAT type questions did not lead to significantly higher scores on the verbal portion of the SAT.

However, studies done by Stanley Kaplan and the FTC (1979) showed significant gains after a 10 week coaching course.

ETS reanalyzed the FTC data and concluded the coaching sessions could add 20 - 35 points to both Math and verbal scores.

Demographic Differences in SAT scores :

SAT scores increased from 1950's - 1960's

And have been declining ever since.

The SAT scores were renormed in 1996, to bring the mean back to 500 and the standard deviation back to 100.

Declines occurred both sexes, for all ethnic groups, and for both low and high performers.

Numerous Explanations for the drop in Scores :

Television

Less parental attention

Teachers paying less attention to students

Less parental supervision

Less parental concern

Students less motivated

Substance Abuse among students

Increased permissiveness in society
Autin& Garber 1982 analyzed the decline in SAT scores

They found that:

1/2 of the variance in the decline in scores was do to difference's in the overall composition of students taking the exam.

As college became more accessible to students from middle and lower class backgrounds, more and more students began taking the entrance exam.

As the population of students taking the SAT began to more closely resemble the population of all possible students who could take the exam, the scores dropped.

This is one qualification public schools in NYS make when cautioning parents when interpreting standardized test scores by school district.
If the school district tries to maximize the proportion of students taking these exams, they will take pains to mention that fact when their "report cards" come out.
A high level of performance at a school where only 20% of students take that exam can not be meaningfully compared to test performance from a school which has 85% of their students take the standardized exam.
Demographic Differences in Scores

Examine Gender, Geography, and Ethnicity
Gender : Men score 37 points higher than females on SAT-Math section. Testosterone, hemispheric lateralization, differential reinforcement from math teachers, and differential cultural expectations are four hypothesized differences for this discrepancy.

Men score 7 points higher than women on the SAT verbal section.

Bob Shaffer from Fairtest : Girls are more inclined to think through a problem, and weigh all the options, and that puts them at a strategic disadvantage in multiple choice tests.
This gender gap means women are less likely to receive scholarships than men.

ETS claims the gender gap represents genuine differences in education.

In college freshman and sophomore years, the women achieve a higher GPA than men, on average.

Ethnicity Differences in SAT scores

SAT scores for Asian-Americans is higher than for Caucasian Americans

SAT scores for all other minority groups fall below the test score levels of Caucasian Americans.

These lower SAT scores are accounted for in large part by :

Lower family income of minorities, compared to Caucasians

Lower Educational level of Parents, compared to Caucasian parents.

Average SAT scores from large cities are typically lower than average.

Average SAT scores from suburban regions are typically higher than average.

To the degree primary education systems suffer from institutional racism as a result of funding policies, the class differences which produce error variation in SAT scores will still persist into the future.

Conclusion

Despite the many criticisms, the SAT is still the single best predictor of who will be seen a s academically successful during the first year of college.

The SAT's will continue to be used extensively in the future.

The differences in education exposed by the SAT (gender, ethnicity, geographic) illustrates areas of improvement which must be made to ensure equal opportunity for higher education for all Americans, not simply those who are well off financially and live in educational districts where high levels of educational attainment is the norm, rather than the exception. Both 2000 presidential candidates have stated that education is one of their "top priorities" should they be elected. Bush is pushing "National Testing" as a way to ensure progress is being made.

Diagnostic testing and remedial measures
Role of Remedial Teaching

In order to improve mathematics, effective remedial teaching is a must. Let us discuss.

Remedial teaching is not re-teaching. Any remedy however costly or sophisticated is useless unless it cures the disease.

A remedial teacher should have a mentality of a sympathetic doctor who has love and care for his/her patients (students).

A. Identification:

a) Through academic achievement:

i) Class interaction: An under-achiever will give wrong answers frequently to the questions asked. He will appear to be confused. He may probably not respond to the questions asked in the class at all.

ii) Home assignment: An under-achiever will not do the homework. If pressurised to complete the work, he may resort to copying, which may be easily detected.

i) Unit tests and term tests: He will show poor performance consistently in tests. He will either not attempt the question(s) at all or, will do cuttings and overwriting. He may even try to copy the solution to the problems from his peers.

b) Through behavioural aspect:

i) Attitude towards academic activities: He will be disinterested in such activities. He will try to refrain himself from such activities. He will try to avoid discussion about academics with his peers or teachers.

ii) Class escapism: He will try to bunk classes for one reason or another. He will give excuses for not attending classes.

ii) Fiddle with notebooks instead of studying: He will be found to fiddle with notebooks and books instead of studying.

Once the under-achiever has been identified, the next step is the diagnosis of deficiencies.

B. Diagnosis of deficiencies:

a) Learning of concepts: His concept(s) related to a particular topic or formula is not clear. For example, the difference between 2x2 and (2x)2 may not be clear to him.

b) Computational Skill: He may not be good at computations and thereby may gives erroneous results frequently while performing basic arithmetical operations and simplification.

c) Procedure of solving problem: He is not clear about the procedure of solving problems and so he/she often gets wrong answers.

d) Application of knowledge: He may not be able to apply the learned knowledge in different situations. For example, in word problems, he may fail to translate sentences into equations or identify the variables.

Once, the deficiency has been diagnosed, let us explore the possible causes for the same.

C. Causes:

a) Memory: Individual capacity of memorising facts and figures.

b) Understanding: Lack of comprehension-he does not follow what he reads.

c) Presentation: Finds difficulty in expressing views-vocabulary is not sufficient.

d) Knowledge Gap: Incomplete coverage units in the previous class-long absence.

e) Parental background: Socio-economic status; education

f) Parental attitude: Indifference of parents towards studies; over-expectation.

g) School Based: Lack of suitable equipment and environment in school-overcrowded class.

h) Medium of instruction: Language problem.

i) Physical factors: Poor eyesight; poor audibility; illness and other problems.

j) Individual factors: Good in oral tests but does not prepare notes and does not do home work regularly; not sincere in studies; very anxious but is unable to concentrate on studies; lacks self confidence; inferiority feeling; fear of failure; wants company of students who avoid classes; emotional instability.

k) Teacher based: Lack of confidence in teacher; lack of time at teacher's disposal; faulty method of teaching; does not encourage student participation in class; inadequate home assignments and problems for practice; improper way of correction of homework and of guidance to students at appropriate time and stage.; knowledge of the subject is not thorough; unable to clarify difficult concept; lacks in expression; unable to provide secure and affectionate climate in classroom and lack of understanding and acceptance for each individual child.

The causes having known let us now discuss about the possible cures and remedies.

D. Cures and Remedies:

a) Category wise remedial-not more than 5 to 10 students in each class.

b) Personal and individual attention by teacher.

c) No humiliation.

d) Special carefully devised UAA (under achiever's assignment) - Simpler-Simple-Complex.

e) Read-Re-read-Write-Re-Write-Reproduce-Drill.

f) Group studies; group learning.

g) Micro-notes.

h) Teaching selected portion of syllabus only.

I now propose an action plan to be undertaken by a remedial teacher.

THE ACTION PLAN:

Out of two approaches of evaluation in vogue today, i.e. the process approach focusing on the performance of the teacher and the product approach focusing on the performance of the students with regard to specific objectives-here to get high score in the examinations in terms of marks and subject average, the latter is preferred for sure for obvious reasons. This process is based on the principle that what ever the teacher might have done in the class room is irrelevant unless the objective (of obtaining a high score in the examinations in terms of marks and subject average) is achieved. This then is the primary criteria of evaluation of both the teacher and the taught at all levels.

Herein lies the importance of diagnostic and remedial teaching, which is therefore, the primary responsibility of the teacher. This type of teaching involves:

i) Diagnosis of the specific difficulty of the student by conducting a suitable diagnostic test.

ii) Providing suitable remedial measures

iii) Providing ways and means for preventing them from reoccurring in future.

If a teacher is able to do justice to his primary responsibility then it may safely be presumed that the teaching profession has a bright future in store for sure.

For the benefit of teachers in general, I am now suggesting an action plan on these lines:

a) Be an innovative and imaginative teacher with an open mind.

b) Apply suitable diagnostic test to identify the weakness of each child.

For this split the topic into several subtopics. For example, a topic in class X Mathematics "Linear simultaneous equations in two variables" –solution of equations can be split as:
i) Adding the two equations directly to find the value of the variables.

ii) Changing the sign and adding the equations to find the value of one variable.

iii) Making coefficients equal and using i) or ii) above to find the value of the variables.

iv) Substituting the value of one variable in the equation to find the value of the other variable.

II. . Set at least 20 questions on each subtopic (They should preferably be knowledge based)
Take a test of each child. One subtopic to be tested at a time.
As far as possible uniformity is to be maintained while evaluating the test.
A student scoring less than 35% marks in this test is surely having difficulty in the subtopic.

c) Explore the causes of weakness which may be:

i) Lack of understanding/misconceptions.

ii) Faulty teaching method.

iii) Fear of the subject

iv) Bad work study habits.

v) Physical and emotional factors like poor health, some mental shock etc.

vi) Teacher's attitude.

d) The cause(s) having been identified, suitable remedial measure (depending upon the cause) should be suggested which may be:

i) Re-teaching of the subtopic---should be resorted to only if the student has completely failed to understand the subtopic due to one reason or the other.

ii) Computer Aided Teaching---should be resorted to if the student has a vague idea about the subtopic and therefore finds it difficult to answer questions relating to it.

iii) Drilling of Problems---Should normally be prescribed to the weak child during examination times. For this the teacher should be able to design an effective study material containing objective questions, knowledge based problems; the practice/drilling of which will cure the weakness.

iv) Other Measures:

The work of the teacher does not end here. He/She must ensure that the student continuously practices upon them to ensure that the weakness does not reoccur in future.

To conclude, it may be said that this is indeed a gigantic task with immediate rewards a remote possibility; therefore requires zeal, enthusiasm and a sense of commitment on the part of the teacher to undertake this project.

Last but not the least; the institution has to play a pivotal role to achieve the ultimate objective. The difference between supervised study (study under the supervision of a teacher) and remedial teaching be clearly understood. The supervised study time table be framed in such a way that a teacher should be assigned at least two periods a week in Maths, Science, English and Social Studies (the subjects where maximum weakness is found). The teacher on his part should not just while away his/her time but should perform these activities as suggested above in letter and spirit and then and only then the ultimate objective can be achieved. He/She must remember that if a student fails then: the teacher has failed; the examination system has failed; the evaluation system has failed and by and large the education system as a whole has failed.

All seems well as regards the theoretical aspect of it is concerned. But when we come to its practical aspect we get confused as to what actually we are expected to do during remediation to

achieve the desired quantitative result (Quality comes thereafter!). Therefore, until and unless we are clear about it, we cannot expect improvement in the results whatever strategies/action plans we may make/adopt to do so.

Based on my experience, I have noticed that the teachers of mathematics are unable to detect the basic weaknesses of children right from class VI onwards leave aside removing them and continue to teach year after year the topics to them based on the syllabi in-order to complete the same (for obvious reasons).

I have noticed that most of the students suffer from some basic weaknesses which are:

Weakness in basic operations. Its removal will enable the students to negotiate with BODMAS rule thereby making simplifications easy. Algebra should also be easy for him/her as Algebra may be defined as "Arithmetic of unknown quantities". Given that the student masters basic operations, the Arithmetic/Algebra/Statistics Portion of Mathematics should be easy to deal with.
Weakness in identifying (understanding) shapes: Its removal will lead to an interest of student in Geometry. This will initiate the student to explore the properties of the shape (closed figures) formed by them leading to understanding of Geometry.
Inability to distinguish between area and perimeter: Its removal will enable the student to solve most of the problems in mensuration.
The teachers can device certain worksheets which may be given to the students repeatedly to over-come their specific weaknesses once they are properly and correctly diagnosed on the basis of factors above.

Some tips for using these worksheets:

The work-sheets should be attempted by HB pencil which is easy to erase later on.
Each worksheet is to be attempted in 5 minutes except the last one which should take 15 minutes for completion.
These worksheets are to be given once a week to each student.
The teacher may use these worksheets during the first two months of the session (April and May) to create an interest for mathematics among the students before starting formal teaching.
After the start of the formal teaching, the teacher should diagnose the weakness of the students (topic wise)-by preparing horizontal mark-sheet in unit tests.
Once the teacher is able to diagnose the weakness of the child in a particular topic worksheets may be provided to the child on that topic during remedial periods to bring the child up to the desired level of competency in the topic. Minimum two work-sheets should be provided to each child and the performance in them is to be judged to ensure that the child has attained the desired level of competency in the topic.
Now where and how to obtain these work-sheets?

I give below some guidelines for the teachers on this issue:

GUIDELINES TO OBTAIN WORK-SHEETS:

Every teacher should create an email account (popularly called E-Mail ID).
The teacher should logon to either: www. mytestbook.com or
www. softschools.com.

He/ She will be asked to register.
On clicking on this hyperlink he/ she will be asked to fill up a form.
Finally he/ she will be asked to submit the same.
On clicking the submit button, the registration will be confirmed and the logon information will be supplied on his/ her E-Mail ID.
Thereafter the teacher may use the username and password provided by him/ her at the time of filling up the form for logon in future.
It is an absolutely free account!
Once the logon is successful, you should opt for automatic work-sheet generator and lo! You are provided with the variety of topics on which work-sheets may be generated.

Suggested Readings: -

Aggarwal, J.C., Teaching of Social Studies, New Delhi: Vikas Pub. 1982.
Bining, Arthur C., Teaching of Social Studies in Secondary School, McGraw Hill, Book Co.
Dash, B.N., Content-cum-Method of Teaching of Social Studies, New Delhi :Kalyani Pub.
Gupta Renu – The methods of teaching Social Studies
Kochhar, S.K., Teaching of Social Studies, New Delhi: Sterling Publications, 1983.
Kohli, A.S., Teaching of Social Studies, New Delhi: Anmol Pub., 1996.
Martorella H. Peter (1994) Social Studies for elementary School Children (Developing Young Citizens)
Mehta, D.D., Teaching of Social Studies, Ludhiana: Tandon Pub., 2004
Michaels U. John – Social Studies for Children (1992)
Mittal, H.C., Teaching of Social Studies, New Delhi: DhanpatRai& Chandna R.N. Sons.
Mottart, Maurice P., Elementary Social Studies Instructions, New York: Longman, Green and Co.
NCERT (1988), Guidelines and syllabi for secondary stage (Class IX, X) N. D., NCERT.
Preston, Ralph C., Handbook of Social Studies, Rhinehart and Company, 1955.
Ruhela, S. P. and Khan R.S. – SamajikVigyanshiksham, kota open University, BE – S
Sandhu, ParamjitKaur, Teaching of Social Studies, Patiala.
Shaida, B.D., Teaching of Social Studies, Jalandhar: PanjabKitabGhar, 1962.
Sidhu, H.S., Teaching of Social Studies, Tondon Publishers, Ludhiana.
Singh, Gurmit and Kaur, Jasvir, Teaching of Social Studies, Ludhiana: Kalyani Publishers, 2007.
Taneja, V.K., Teaching of Social Studies, Ludhiana: Vinod Pub., 1992.
Teaching Social Studies in High School, Wesley Edgar Bruce
UNESCO (1981), Handbook for teaching of Social Studies.
Wesley, Edgar Bruce, Teaching of Social Studies, Boston: D.C. Herth and Co.
Zevin Jack (2000) – Social Studies for the Twenty first Century.

Course Title: Teaching of Social Sciences,
Prepared by
Bhavana Sharma,
Faculty of Education,
FIMT, New Delhi.