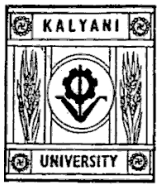
A STUDY ON EFFECTIVE TEACHING LEARNING SYSTEM IN PHYSICAL SCIENCE AT SECONDARY LEVEL SCHOOLS IN WEST BENGAL

A THESIS SUBMITTED TO THE UNIVERSITY OF KALYANI FOR THE FULFILMENT OF DOCTOR OF PHILOSOPHY IN EDUCATION

By

AMARNATH DAS



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CERTIFICATE

This is to certify that the research work entitled **"A STUDY ON EFFECTIVE TEACHING LEARNING SYSTEM IN PHYSICAL SCIENCE AT SECONDARY LEVEL SCHOOLS IN WEST BENGAL"** submitted by Shri Amarnath Das for the fulfilment of the requirements of the award of Ph. D. degree in Education is based on the results of research work accomplished by him. No part of this work has been submitted for any other degree. He has completed the research work under my guidance.

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_____

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CHAPTER – I

I N T R O D U C T I O N

CHAPTER – I
INTRODUCTION

1.1 Introduction

Effectiveness is the criteria through which educational systems may be scaled in Teaching Learning System. We are interested to find out the effective teaching learning system in the present research work so that we can have a better way for realizing education to make it productive.

The various strands of educational-effectiveness research have had contributed to the current multidisciplinary and multi-level conceptualization of school effectiveness will be described in more detail.

Teaching Learning system is seen as the degree to which schools achieve their goals in terms of student-intake, and other conditions by the school or the immediate school context.

1.2 Background Study

Teaching Learning System is the focus of the evident in the feelings and attitudes about a school expressed by students, teachers, staff and parents and other stakeholders with its Environment. Teaching Learning System is a significant element in discussions about improving academic performance and school reform.

Components of School Environment in Teaching Learning System :

Although there is no consistent agreement in the literature on the determinants of school Environment, most writers emphasize caring as a core element.

Several aspects of a school's physical and social environment comprise its identified following areas are given below :

- Appearance and physical set-up.

- Faculty relations.
- Student interactions.
- Leadership or decision making.

School Performance and Academic Achievement :

Numerous studies document that students in schools with a better school climate have higher achievement and better socio-emotional health. Probably the most comprehensive work in this area is being done by the Search Institute, a nonprofit organization that encourages schools and communities to develop and empower young people.

In a review of studies on the impact of support in school, the Search Institute found that a caring school is associated with Academic Achievement both in qualitative and quantitative way for better Teaching Learning System.

- Higher grades,
- Engagement,
- Attendance,
- Expectations and aspirations,
- Sense of scholastic competence,
- Fewer school suspensions,
- On-time progression through grades,
- Higher self-esteem and self-concept,
- Less anxiety, depression and loneliness and
- Less substance abuse.

Another study by John Schweitzer of Michigan State University, found that when students in Detroit schools felt a sense of community with one another and a sense of belonging to their schools, they achieved higher scores.

Teaching Learning System and Instructional Effectiveness :

Improving student behavior and academic performance generally requires changing school climate and school culture. Change may require moving individuals and organizations along a continuum from improving teaching Learning System.

While making positive changes in school climate motivates staff and students to improve, the district-level school culture must also change if school reforms are to be sustained for long-term improvement.

In Teaching Learning System, significant attention is to be given when major changes are being implemented in the school system. It is worth noting that educational reform under the No School Left behind is essentially a long-term effort to change school culture. The central themes of educational reform for better teaching learning consider the following points :

- Teachers and the school are accountable.
- All children can and must learn.

Some Approaches towards Teaching Learning System :

Promoting a Safe and Orderly Environment.

- Maintain buildings in good physical condition.
- Reward students for appropriate behavior.
- Enforce consequences for inappropriate behavior.
- Use contacts with students to reinforce behavioral expectations.
- Post behavioral policies on bulletin boards; periodically announce them over the public address system.
- Initiate anti-bullying, conflict resolution and peer mediation programs.
- Engage students, staff and parents in planning school safety activities.
- Increase number and accessibility of counselors, social workers and mentors.

- Create anonymous tip lines or suggestion boxes for reporting potentially dangerous situations or providing ideas to improve school climate.
- Develop strategies to ensure safety during lunch periods and between classes; provide more structured activities during lunch hour.
- Provide accommodation or time-out rooms throughout the day.
- Provide in-school suspension programs with academic supports and consistent staffing

According to Kelli Ballard and Alan Bates, accountability, high-stakes, and student achievement are popular terms among educators. Students' performance on standardized achievement tests is used to a high extent in reflecting the quality of instruction students receive from teachers as an intra-culture.

According to Vandevoort, Amrein-Beardsley and Berliner (2004) the quality of a teacher in the classroom is the single most important factor in determining how well a child learns. Throughout the United States, schools are being evaluated based on their students' performance on a state mandated test given every year for the betterment of the total process. The two main purposes are :

1) Teachers' accountability,
2) Assuring quality and facilitating improvement institutional atmosphere.

It will best be achieved when teachers and their organizations claim the responsibility for developing and implementing methods for assessing their performance that respect the complexity and depth of their professional knowledge and practice (Kleinhenz & Ingvarson, 2004). In other words, do current teacher evaluation procedures assess all the components that teachers are supposed to possess ?

The majority of educators agree with the fact that holding teachers accountable is imperative for student learning to take place. However, a lively

debate surrounds the question of how accountability is established and about the place and value of professionalism in accountability (Bullough, Clark, & Patterson, 2003).

According to Gallagher (2002), schools such as Vaughn Elementary in Los Angeles, California evaluate teachers in ten domain areas, and teachers are not only evaluated by their principal, but by peers and themselves, too. Teachers are rated on a scale of one to four on each standard. This school found that the alignment between taught and tested curriculum, both in terms of content and cognitive demand, is a highly significant predictor of student performance. This study did make it clear, however, that no single measure should be seen as the sole criterion for judging performance rather than combining both the intra and determinants for academic success.

As Gallagher (2002) concurs, most people would argue that teaching requires a variety of proficiencies that can justifiably contribute to teacher evaluation, yet which may only indirectly influence student performance on a given assessment. Teachers need to become familiar with current research on student achievement and network with colleagues to learn more about teaching expertise.

Teachers are responsible for finding ways to educate all children and it is a teacher's duty to participate in professional development activities that foster this responsibility. Practices such as differentiated instruction, data driven instruction and identifying areas of weakness in students are crucial to developing the quality of classroom teachers. Differentiated instruction is vital for increased student performance because it meets the needs of every student. This connects to the notion of schools making improvements based on test data, especially in weak areas. Teachers need to remember that external characteristics, such as student socio-economic status and parental educational attainment, impact student achievement in significant ways, but when those differences are controlled for, teachers are the most important determinants of

student achievement (Gallagher, 2002). These findings support the views of Bullough *et al.* (2003) that if, as some teacher education detractors argue, academic ability and scores on standardized achievement tests are good measures of teacher quality, these students ought to be outstanding.

Because of increased accountability in Teaching Learning System demands places on schools and teachers, researchers question how influential these outside factors are, especially those that cannot be controlled by classroom teachers. Thrupp, Mansell, Hawksworth, and Harold (2003) found that educators were adamant that they could only be held accountable for student achievement to a limited extent because of the impact of family background. In their study, teachers, principals and governors were asked how accountable they felt school staff could actually be for student outcomes. The majority of the participants in the study felt that "outcomes-based assessment of schools would always be unfair because of the way it assumes the efforts and effectiveness of staff can be read off student achievement" (Thrupp *et al.*, 475).

Another factor that influences student achievement is the status and parental level of education as well as the home / family background was found to be uncontrollable factor in the classroom where high stakes tests were administered. Other schools have relatively high test scores and their student population consists of primarily low-income students with little parent involvement, which argues against the excuse of not being able to control certain factors. Student's performance on high stakes tests can cause increased levels of anxiety, stress and fatigue. All three have detrimental effects on student's performance (Abrams, Pedulla, & Madaus, 2003) we can consider for teaching and learning :

1) Motivation and responsibility of the individual student.
2) Socioeconomic status.
3) Students with high test results are rewarded externally.
4) For students who do not perform well, such as those with test anxiety,

language barriers or special education students who are required to take a grade equivalent test, this extrinsic reward system can be devastating.

5) Research shows that in many cases, classroom instruction is changing to better match the content found on high-stakes tests. Also, instruction focuses on test content or test-taking skills and ignores subject areas that are not on the test. High-stake tests limit the scope of the classroom instruction and student learning in undesirable ways (Stecher & Barron, as cited in Abrams *et al.*, 2003).

6) In a study by Cankoy and Tut (2005), one group of fourth grade students spent 70% of class time on test-taking skills, a second group spent 50% of class time on test-taking skills, and a third group only spent 30% of class time on test-taking skills. Test-taking skills included completing test questions from former tests, giving tests for drill, teaching procedures for answering multiple-choice questions and memorizing rules. The study found that teaching students standard procedures to solve different types of math problems is not an effective approach to teach problem solving. Also, there was no difference in the three groups' performances on non-routine math story problems, and spending more class time on test-taking skills did not affect the non-routine story problem solving. To conclude, this study feels that tests and classroom instruction should emphasize and foster problem-solving skills more so than test-taking skills.

Howard Miller, Associate Professor of Education at Lincoln University, has established twelve steps for teachers to promote teaching and learning. These are as follows :

1. Develop a set of written expectations you can live with and enforce.
2. Be consistent. Be consistent. Be consistent.
3. Be patient with yourself and with your students.
4. Make parents your allies. Call early and often. Use the word "concerned". When communicating a concern, be specific and descriptive.

5. Don’t talk too much. Use the first 15 minutes of class for lectures or presentations, then get the kids working.
6. Break the class period into two or three different activities. Be sure each activity segues smoothly into the next.
7. Begin at the very beginning of each class period and end at the very end.
8. Don’t roll call. Take the roll with your seating chart while students are working.
9. Keep all students actively involved. For example, while a student does a presentation, involve the other students in evaluating it.
10. Discipline individual students quietly and privately. Never engage in a disciplinary conversation across the room.
11. Keep your sense of perspective and your sense of humor.
12. Know when to ask for help.

According to Center for Teaching Effectiveness at Pennsylvania State University, the following dimensions are adopted for managing the classroom environment :

1. Start class on time, sending a message that being there is important.
2. End class on time.
3. Announce your class hours and keep them faithfully.
4. Set policies at the beginning of the course.
5. Be conscious about ethnographic position in the classroom situation.
6. Refer students with psychological, emotional, academic, or financial trouble to the appropriate counselors. You can be sympathetic and supportive, but becoming a student’s counselor can cause problems.
7. Involve yourself only to the extent that you are expected to be involved.

Another way to apply the ideals of a positive classroom climate, according to the Indiana University Center for Adolescent Studies, is to create a peaceful

classroom. The Center promotes seven guidelines :

1. Have a genuine interest in your students.
2. Communicate classroom rules clearly.
3. Be objective, not judgmental.
4. Show that you are human.
5. Minimize the power differential in everyday communication.
6. Address problem behavior directly and immediately.
7. Adopt a collaborative approach.

(Hawley, 1997).

Effective Teaching Strategies for Direct Instruction :

- Specify clear lesson objectives.
- Teach directly to those objectives.
- Make learning as concrete and meaningful as possible.
- Provide relevant guided practice.
- Provide transfer practice activities.

Effective teaching should be thought of as helping students to learn and every student encounter should be thought of as a student's opportunity for learning.

Foster a Good Learning Atmosphere :

- Be serious without creating excessive tension
- Be prepared, have a flexible teaching plan in mind but be ever on the lookout for the "teachable moment".
- Be positive toward learners, guard against sending unintentional messages.
- Be confident (not arrogant) but comfortable in not knowing everything.

Use of Effective Teaching Techniques :

- State what should be learned here.
- Situate the topic in respect to the adequate context.
- Involve learners in the process by having them, for example, present the problem, respond to questions, summarize the findings and discussion and research and report on unanswered questions.
- Use questions effectively.
- Summarize at the end of discussion or activity.
- Use follow-up research and reporting to the group in a classroom situation.

Effective teaching is the basis of successful learning. Effective teaching identities and builds on prior knowledge, makes real life connections, develops deep understanding and monitors and reflects on learning.

Observing Effective Schools :

1) An effective school is a school in which students achieve high standards that they can use in their fulltime education or the workplace, a school where students feel safe and happy.
2) It promotes those values that will help pupils to become good and responsible citizens, enable them to become involved in their community and become good family members. We all write these sort of things in our school mission statements and school documents, but we are all too often distracted from them in day-to-day planning.
3) High standards are not the preserve of a few socially advantaged individuals and we should never lower our expectations on the basis of social background. For that reason, contextual data can leave us too easily satisfied with poor performance.
4) Establishing priorities in your own school will necessarily come from a consultation with school stakeholders.

In our country at the end of 20th century we are looking for globalized pattern of education system which seeks to clarify productive nature of education. Most of the schools in West Bengal are now not in the position to evaluate itself in this way but that does not mean we cannot avoid the reality. Some important aspects of institutional effectiveness are furnished below :

Empowering Leadership :

The key role for a head teacher is that of empowerment, creating a culture in which the vast intellect, ability and talent of the staff is not only solved, but fully utilized. If head teachers do not make it clear that all staff have the authority to make decisions, to be innovative and creative, then they will assume that they do not. If that happens, the vast wealth of knowledge and experience that exists in all schools will remain untapped.

Relying on Collaboration :

Choosing the appropriate networks to work with a matter of personal choice and school context. It is useful to work with local school leaders through local authorities in collaboration. Leadership incentive grants, Excellence in quality practice and so one can develop initiatives that may directly involve students across a locality.

Effective School Leadership :

Although it is recognized that head teachers pay a crucial role in school-wide effort to raise standards of teaching and pupil learning and achievement, evidence-based knowledge of what makes successful leaders remains elusive. The most popular theories are located in the transaction and transformational models identified more than 20 years ago (Burns, 1978) and lately reinvented through such terms as ‘liberation’ (Tampoe, 1998),‘educative’ (Duignan& Me Pherson, 1992), ‘invitational’ (Stoll & Fink, 1996) and ‘moral’ leadership (Sergiovanni, 1992).

What is clear from these and from the effective school literature, is that successful leaders not only set direction but they also model values and practices consistent with those of the school, so that 'purposes which may have initially seemed to be separate become fused' (Sergiovanni, 1995).

Significantly, along with some positive aspects, there were also on going problems. Heads of different institutions worked long hours and were enabled to continue to develop partly through the unsung support of external network of colleagues, friends and family. It was however, both their personal values and their abilities to maintain and develop learning and achievement cultures, at the same time they have to manage some ongoing tensions and dilemmas, which were the main features of their success :

1. Leadership versus management.
2. Development versus maintenance.
3. Internal versus change.
4. Autocracy versus autonomy.
5. Personal time versus professional tasks.
6. Personal values versus institutional imperatives.
7. Leadership in small versus large schools.
8. Develop or dismiss.
9. Power with or power over.
10. Subcontracting or mediation.

According to Sammons, Hillman and Mortimore (1995) the characteristics that help make a school effective are broadly outlined as follows:

1. Focus on teaching and learning.
2. Purposeful teaching.
3. Shared visions and goals.
4. High expectations of all learners.
5. Accountability.

6. Learning Communities.
7. Stimulating and secure learning environment.
8. Professional leadership.

Focus on Teaching and Learning :

Effective schools are focused primarily on teaching and learning. They carefully consider time spent on academic and non-academic learning. Effective schools deploy their resources strategically to enhance teaching and learning. Professional learning activities and programmes are aimed at improving the teaching-learning relationship, paying particular attention to developing the subject and pedagogical knowledge of teachers.

Forming answers to the following questions may help to provide a focus on teaching and learning in a school :

- How well does our school manage the time spent on the there strands ?
- Identify one or two strategies that were implemented in the school to bring about improvement in the teaching-learning relationship. Analyse how effective the strategies have been. What worked well ? What hindered successful or full implementation ? Should the strategies be persevered with ?
- How effective are our professional learning activities that aim to improve student learning ?
- How well does our school manage the workload of staff, in particular the balance between time focused on teaching and learning and time spent on administrative tasks ?

Effectiveness through Student Evaluation

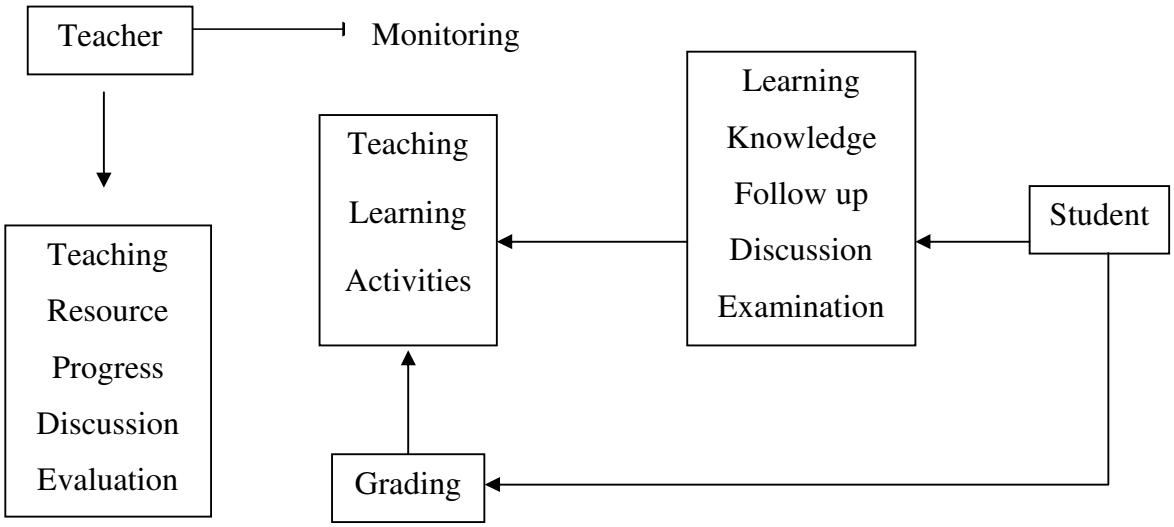
Research on student evaluation of teaching generally concludes that student ratings tend to be reliable, valid, relatively unbiased and useful (Murray, 1994) with the following measures:

1. Evaluations are generally consistent across raters, rating forms, courses

and time periods for a given semester.

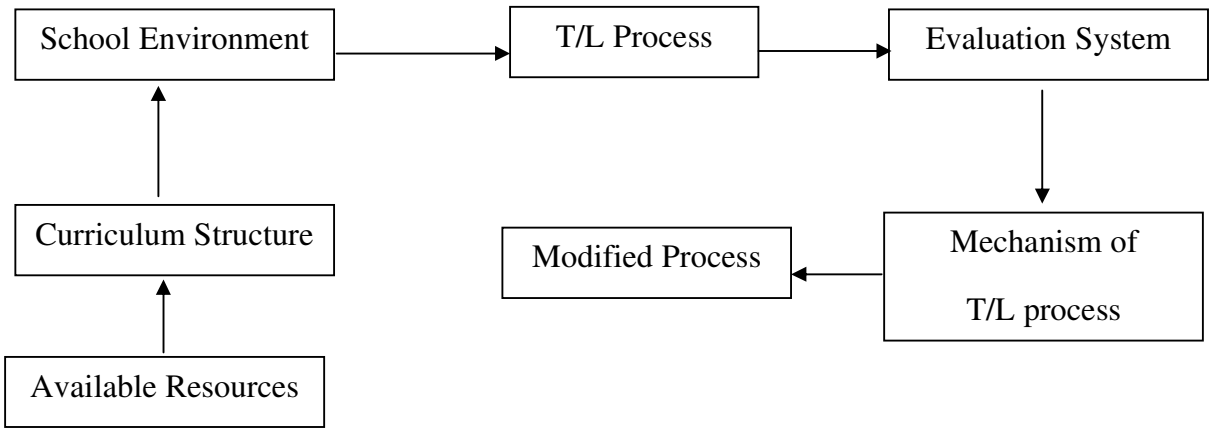
2. They correlate moderately too high with evaluations made of the same instructor by independent observers.
3. They correlate significantly with various objective indicators of student performance such as performance on standardized exams.
4. There are low correlations with extraneous factors such as clam size, severity of grading etc.

Model at the Interactive Teaching-Learning System by Young-shen-chen (2004)



An alternative Indian model by Dibyendu Bhattacharya is also looks relevant mentioned below :

Teaching-Learning System



Here the process being modified by application of the mechanism of teaching learning process in a classroom situation.

The teaching learning system should be based on situational factors, availability of resources, infrastructural facilities, curriculum structure, teaching learning process and examination pattern is that the different components of a Teaching-Learning system.

Investigation will be conducted through survey on the basis of information taken from various schools in West Bengal including school environment, curriculum structure and availability of resources in secondary schools on the basis of a standardized questionnaire.

Remedial solution has been given on the last chapter by giving a suggested model namely Interest Diversification Model after investigating the input and the output. By comparing the input and the product, finally conclusion has been made through mechanism of teaching and learning system.

1.3 Teaching Learning System (2002) by Roy Lee Foley

The process of system dynamics for a teaching-learning system consists of five stages.

- **First stage :** It is the description or mapping of the system. It requires taking various bits of information about teaching-learning systems in the real world and turning them into a unified theory.
- **Second stage :** The formulation and construction of a simulation model is performed. The system description is translated and converted into the level and rate equations of a system dynamics model by providing the requisite parameters. Creating the simulation model requires that the rather general and incomplete description of the first stage be made explicit.
- **Third stage :** Simulation of the model will start after the equations of the previous stage pass the logical criteria of an operable model, such as all variables being defined and consistent units of measures. The first simulation

at this stage will raise questions that cause repeated returns to the prior stage until the model becomes adequate for the purpose under consideration.

- **Fourth stage :** Some policy alternatives are chosen for testing.
- **Fifth stage :** Proposal policy changes will be tried to the model to maintain or obtain sustainable improvement in performance while considering the feasibility of implementing these changes in its real world. If the model is relevant and persuasive, then the process can be concluded for the necessary evaluations.

According to N. Eftekhar and D. R. Strong, 2008 Dynamic Modeling of a Teaching Learning System can be mentioned as follows :

Description of System Structure :

1) The analysis of the dynamic behaviour of a learning process is undertaken using what is termed a "System approach". This approach calls for the consideration of a "Complex" set of relationship as a system. "Complexity" refers to a higher-order, multiple-loop, nonlinear feed back structure. All social systems belong to this class. Educational systems and specifically a learning teaching process that is a complicated set of interrelationships and activities has all the characteristics of a complex system. 2) Application of system analysis to a learning process requires the definition of the structure of interacting functions. The definitions of the structure must identify not only the separate functions but also their methods of interconnection. According to the theory of system structure, the four conceptual hierarchies are the closed boundary, components of the system especially stock level and flow rate variables, feedback loops and policy structure.

2) The closed boundary defines the higher layer of the model. In fact, it is the control system of our interest. In this study, the boundary encloses a single

system for a single student learning process. Interaction between this system and other sub-systems in a learning environment is simplified at this stage. The model structure developed is basically includes a main center-part for a learning process and some arbitrarily supporting infra-structures inside the defined boundary. Parts of the infra-structure represent sub-models and interact with the center-part.

3) The next hierarchy of system structure is the components of the system. These are four basic components of building blocks in the system : the stocks, the flows, the converters and the connectors. Stock levels and low rates relate to the accumulations and activities within the system. Stocks can be referred to as system state variables. They are integrations or accumulations of system flows that represent measurements of the state of the system at any given point in time. Flows are the instantaneous rates of flows that represent the means by which the system is controlled and represent activity points in the system. Converters are auxiliary functions converting states to system activities. They represent the decision process in the system. Finally the connectors are links that connect the components forming are that influence the flows that regulate the system.

4) Feedback loops represent the structural setting which all decisions are made. It is any structure of two or more casually related components that close back or themselves. Thus, the feedback loops provide a format for identifying flows of information and the relevant variables which articulate the system giving rise to cause and effect. For example, information about student achievement can provide an input to decisions concerning degree of student comfort, which in turn, controls the demand of student's effort. Any system which has a purpose has an internal structure of feedback loops through which the system is controlled. Entire feedback loops, as well as the

individual relationships within a loop, are described as either positive or negative. When any variable in a positive loop changes, the resulting interactions cause that variable to change further in the same direction. The positive loop, in other words, characteristically prod ness self-reinforcing change (unrestrained growth). By contrast, when any variable in a negative loop is changed, then the loop causes the variable to readjust in the opposite direction. The negative loop produces self-regulating change (controlling and restorative behavior).

5) Implicit in rate equations, therefore, are the actions and policies which reflect the administration of the learning process. For example, the learning rate equation which controls the amount learned by a student reflects the policy of the student regarding the standards required for acquiring knowledge. Thus the last hierarchy in a general system structure can be defined as policy structure. Decisions are made for a purpose which, in turn, implies a goal which, in turn, implies a goal which the decision process in trying to achieve. Policy structure is mainly reflected in the definition of the rate variables.

1.4 Significance of the Study

A holistic approach has been suggested for explaining the Effective Teaching Learning System in physical science. Mostly it is talked about the effective teaching or sometimes effective school or effective management or administration etc. but what is our observation is that one variable is highly related to another or summation of all the variables makes the system. Therefore it is of interest to develop the system as a whole and try to prescribe for better school. There should be an effective system not only as a single dimension but in the pluralistic way crystallizing the system to produce maximum output.

- The output of the system is dependent on its effectiveness. Effectiveness of a system is therefore a professionalized pattern relevant to the present day

teaching learning scenario.

- In developing countries like India, system approach is very much significant in controlling the quantity and quality ratio; as well it accelerates the quality of education in the present globalized system.

The complexity of teaching and learning can not be removed by mere technology as innumerable components are interrelated and interdependent on it. Therefore an alternative may be focused through this approach with the help of technology and humanizing the system too.

1.5 Objectives of the Study

1. To study the Effective Teaching Learning System in Physical Science at some selected secondary level schools in West Bengal.
2. To construct a standardize questionnaire of Physical Science regarding Effective Teaching Learning System.
3. To find out the components of Effective Teaching Learning System on the basis of review of studies.
4. To determine significance level for Effective Teaching Learning System on the basis of locality.
5. To determine significance level for Effective Teaching Learning System on the basis of gender.
6. To find out mechanism of Teaching Learning System by applying a model in an experimental condition.

1.6 Methodology

The study was survey type descriptive research. For finding out the components of the Teaching Learning System statistically, parametric and non-parametric analyses have been conducted with other descriptive statistics.

A) Tools :

A **s**tandardized questionnaire regarding Effective Teaching Learning System was used for conducting the study.

B) Sample :

Ninth grade students of some selected schools of Bankura district in West Bengal were considered as sample for conducting the study. Sampling technique was purposive in nature. Two hundred samples were taken randomly for conducting the t-test and 90 samples were taken for Chi Square Test.

1.7 Limitations

1. The study was confined to only ninth grade students of West Bengal.
2. For Teaching Learning System, only some of the components were taken to explain the system as a whole.
3. For statistical analysis, only selected softwares were used for study.

CHAPTER – II

REVIEW OF

RELATED STUDIES

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2.1 Secondary Education Commission Report, 1952–53 (Ministry of Education, Madras 1953)

Terms of Reference :

Under the Terms of Reference, the Government was asked to suggest measures for its reorganization and improvement with particular reference to

1. the aims, organization and content of secondary education;
2. its relationship to primary, basic and higher education;
3. the inter-relation of secondary schools of different types and
4. other allied problems.

Summary of Recommendations :

1. Aims and Objectives of Secondary Education :

The Commission has said in their report : "As political, social and economic conditions change and new problems arise, it becomes necessary to re-examine carefully and study clearly the objectives which education at each stage should keep in view. Moreover, this statement must take into account not only the facts of the existing situation but also the direction of its development and the nature and type of the social order that we envisage for the future to which education has to be geared".

In the Commission's opinion, the most outstanding and educationally relevant facts in the Indian situation were :

i) the adoption of the goals of democracy and socialism necessitating the development among the people of a broad, national and secular outlook;
ii) the extreme poverty of the country and urgency for promoting its economic growth; and
iii) the absence of educational facilities needed for developing all aspects of the

human personality and the neglect of cultural pursuits and activities.

On the basis of this analysis, the Commission recommended that secondary education should be reoriented to the following aims and objects :

a) **Development of qualities essential for creative citizenship :** This includes the development in the students of secondary schools of those habits, attitudes and qualities of character which are essential for creative citizenship in a democratic society. Among these qualities, which are to be fostered through curricular and co-curricular activities in secondary schools, are :

i) The capacity for clear thinking (allied which is the capacity for clearness in speech and writing);
ii) The scientific attitude of mind;
iii) A receptivity to new ideas;
iv) A respect for the dignity and worth of every individual;
v) The ability to live harmoniously with one's fellowmen through the cultivation of discipline, cooperation, social sensitiveness tolerance and
vi) A sense of true patriotism.

b) The promotion of vocational efficiency : This involves not only the creation of a new attitude to work and an appreciation of the dignity of manual labour but also the development of the students' technical skill and efficiency through greater emphasis on craft and productive work and the diversification of courses at the secondary stage.

(c) Development of personality : This implies cultivation of the students' literary, artistic and cultural interests for a fuller development of their personalities. This means the provision of subjects like art, craft, music, dancing and hobbies in the secondary school curricula.

(d) The training for leadership : The training of persons who, on completion of the Secondary stage, would be able to assume the responsibilities of leadership at the intermediate level.

2. Methods of Teaching :

a) Inculcation of values, attitudes and work habits : The methods of teaching in schools should aim not merely at the imparting of knowledge in an efficient manner, but also at inculcating desirable values and proper attitudes and habits of work in the students.

They should, in particular, endeavour to create in the students a genuine attachment to work and a desire to do it as efficiently, honestly and thoroughly as possible.

b) Activity and project methods : The emphasis in teaching should shift from verbalism and memorization to learning through purposeful, concrete and realistic situations and, for this purpose, the principles of Activity Method and Project Method should be assimilated in school practice.

Teaching methods should provide opportunities for students to learn actively and to apply practically the knowledge that they have acquired in the classroom. Expression Work of different kinds must, therefore, form part of the programme in every school subject.

c) Emphasis on clear thinking and expression : In the teaching of all subjects special stress should be placed on clear thinking and clear expression both in speech and writing.

d) Training pupils in techniques of study : Teaching methods should aim less at imparting the maximum quantum of Knowledge possible, and more on training students in the techniques of study and methods of acquiring knowledge through personal effort and initiative.

e) Instruction to suit different student abilities : Attempt should be made to adopt methods of instruction to the needs of individual students as much as possible so that dull, average and bright students may all have a chance to progress at their own pace.

f) Group projects and activities : Students should be given an adequate opportunity to work in groups and to carry out group projects and activities so as to develop in them the qualities necessary for group life and cooperative work.

3. Examinations and Evaluation :

Reviewing the defects of examinations at the secondary stage, the Education Commission said :

"The examinations today dictate the curriculum instead of following it, prevent any experimentation, hamper the proper treatment of subjects and sound methods of teaching, foster a dull uniformity rather than originality, encourage the average pupil to concentrate too rigidly upon too narrow a field and thus help him to develop wrong values in education. Pupils assess education in terms of success in examinations. Teachers, recognizing the importance of the external examination to the individual pupils, are constrained to relate their teaching to an examination which can test only a narrow field of the pupil's interests and capacities and so inevitably neglect the qualities which are more important though less tangible."

a) External Examination — Introduction of Objective Type Tests :

The number of external examinations should be reduced and the element of subjectivity in the essay type tests should be minimized by introducing objective tests and also by changing the type of questions.

b) School records for assessment of all-round progress : In order to find out

the pupil's all-round progress and to determine his future, a proper system of school records should be maintained for every pupil indicating the work done by him from time to time and his attainments in the different spheres.

c) In the final assessment of the pupils due credit should be given to the internal tests and the school records of the pupils.

d) Symbolic marking to replace numerical marking : The system of symbolic rather than numerical marking should be adopted for evaluating and trading the work of the pupils in external examinations and in maintaining the school records.

e) One public examination – final comprehensive certificate : There should be only one public examination at the completion of the Secondary School course.

f) The Certificate awarded should contain, besides the results of the public examination in different subjects, the results of the school tests in subjects not included in the public examination as well as the gift of the school records.

g) The system of compartmental examinations should be introduced at the final public examination.

h) Board of Secondary Education to be set up : There should be a Board of Secondary Education consisting of not more than 25 members with the Director of Education as its chairman to deal with all matters of education at the Secondary stage and to lay down general policies.

A sub-committee of the Board should deal with the conduct of examinations.

4. Buildings and Equipments :

a) School buildings-space per pupil : Normally, in designing buildings for schools, care should be taken to see that an area of not less than 10 sq. ft. is provided per student in the classroom.

b) Optimum strength of class and school : The optimum number of boys to be admitted to any class should be 30 and the maximum should not in any case exceed 40; the optimum number in the whole school should be 500 while the maximum should not exceed 750.

c) Research required on school buildings, furniture and equipment : In the type design of schools as well as the furniture, etc., research should be carried on to improve functional efficiency and to adjust them to Indian conditions.

An Expert Committee should be appointed to lay down carefully the amount and the kind of equipment required for various types of diversified courses and workshops.

d) Land for educational purposes : The State Governments and the Centre should, wherever possible, assign lands to schools for playgrounds, buildings or agricultural farms and other necessary purposes without any charge.

e) Exemption from customs duty for equipment and books : In order to popularize progressive teaching methods and facilitate their introduction, "Experimental" and "Demonstration" schools should be established and given special encouragement where they exist, so that they may try out new methods freely without being fettered by too many departmental restrictions.

5. Teachers :

a) Guide material for teachers : Suitable literature for the guidance and inspiration of teachers should be produced by the Education Departments of all

States and either the office of the Director of Education or one of the training colleges should be adequately equipped for the purpose.

b) Special committee to review the scales of pay : A special committee should be set up to review the scales of pay of teachers of all grades and recommend such scales of pay that will meet in a fair and just manner the varying cost of living.

National Policy On Education 1979 suggests that "the present system of education must be reorganized is the light of contemporary Indian realities and requirements".

Secondary education is very important for the continuation among secondary (10^{th} grade), higher secondary (12^{th} grade) and primary education. National Policy on Education 1979 rightly comments, "The entire educational system has to be seem as one chain".

It is true that after independence number of secondary schools have been increased rapidly in India supported by the following informations :

- No. of schools in 1950-51 — 7300 (Secondary Level)
- No of schools in 1982-83 — 52, 279

Ref : Challenge of Education 1986.

2.2 Education Commission Report, 1964–66 (Education and National Development, Manager of Publications, Delhi, 1966)

Main Recommendations :

The report makes recommendations about various sectors and aspects of education, some of which are as follows:

1. Work-experience and social service should be introduced as integral parts of general education at more or less at all levels of education.
2. Secondary education should be vocationalised.
3. Mother-tongue has a pre-eminent claim as medium of instruction at school

and college stages. Moreover, the medium of education in school and higher education should generally be the same. The regional language should, therefore, be adopted as the media of education in higher education.

4. The teaching and studying of English should continue to be promoted right from the school stage. English will serve as a link language in higher education for academic work and intellectual inter-communication.
5. The Central and State Governments should adopt measures to introduce education in moral, social and spiritual values in all institutions under their control.
6. Secondary schools should be of two types – high schools providing a course of 11 – 12 years.
7. Education, as distinguished from pedagogy, should be recognised as an independent academic discipline.
8. Duration of training courses should be two years for primary teachers who have completed the secondary school course. It should be one year for the graduate students.
9. Science and mathematics should be taught on a compulsory basis to all pupils as a part of general education during the first ten years of schooling.
10. No single stage of education need be designated as basic education, but its essential principles should be retained to guide and shape the educational system at all levels.
11. External examinations should be improved by orienting question papers to objectives rather than to acquisition of knowledge, by improving the nature of questions, adopting scientific scoring of scripts.
12. Internal assessment should be comprehensive and evaluate all aspects of student growth.
13. Some centres of advanced study and a small number of major universities should be set up with the view to achieving highest international standards.
14. Education for agriculture, and research in agriculture and allied sciences

should be given a high priority in the scheme of educational reconstruction.

15. The Ministry of Education, in collaboration with the Asian Institute of Educational Planning, should under. According to Indian Parliamentary & Scientific Committee 1961 science education should be imparted on the basis of practical orientation and vocation based. Science education in secondary level would be on the general basis.

2.3 Education in Secondary Schools regarding Teaching Learning System (G. I. Press, New Delhi, 1964)

Main Recommendations :

The following are some of the recommendations made by the panel :

1. The Education Department of each State should frame proposals for the new academic year well in advance of the start of the academic session furnishing full details. This will help schools to complete formalities and procure science equipment in time for the new session.
2. When science teaching is introduced in a high school, a minimum amount of Rs. 10,000 may be earmarked for setting up a reasonably well-equipped laboratory for Physics and Chemistry. In case Biology is also introduced, an additional amount of Rs. 300 should be provided.
3. For middle schools, a sum of Rs. 4,000 for science equipment is considered essential.
4. Each middle and high school should have a workshop attached to it for which a grant of Rs. 1,000 should be sanctioned separately.
5. Adequate facilities should be provided to science teachers and students for working on hobbies during school hours and in spare time. Refresher courses and workshops should be arranged for teachers periodically.
6. The creation of a separate branch of Science Education in each State Department of Education under a special officer would strengthen the steps being taken at various levels for improvement of science teaching. The

report has six appendices dealing with various aspects of science equipment and apparatus required for high schools and middle schools.

After post independence (1947), to impart science education was rather difficult in India. Because before independence science education was limited in a particular section. But after independence separate educational strategy had been taken where mass education was an emergent need. Therefore a balance had to maintain between the need and demand on science education on that time. In 1964 the report was basically on the above reason specially framed on the basis of socio-economic condition. Science education was encouraged on the secondary schools in India in the above report.

2.4 National Knowledge Commission and Higher Education

Meaningful reform of the higher education system, with a long-term perspective is both complex and difficult.

First, it is essential to reform existing public universities and undergraduate colleges.

Second, it is necessary to overhaul the entire regulatory structure governing higher education.

Third, every possible source of financing investment in higher education needs to be explored.

Fourth, it is important to think about pro-active strategies for enhancement of quality in higher education.

Fifth, the time has come to create new institutions in the form of National Universities that would become role models as centres of academic excellence.

Sixth, the higher education system must be so designed so that it provides access to marginalized and excluded groups.

Even so, we believe that reforms in the following spheres, along the lines suggested by us, are not only possible but would also make a difference.

Number and Size :

India has about 350 universities. This number is simply not enough with reference to our needs in higher education, or in comparison with China which has authorized the creation of 1250 new universities in the last three years. Yet, some of our universities are much too large, for ensuring academic standards and providing good governance. We need to create more appropriately scaled and more nimble universities. The moral of the story is not only that we need a much larger number of universities, say 1500 nationwide by 2015, but also that we need smaller universities which are responsive to change and easier to manage.

Curriculum :

The syllabi of courses in universities, which remain unchanged for decades, need to be upgraded constantly and revised frequently. The laws of inertia reinforced by resistance to change must be overcome. Universities should be required to revise or restructure curricula at least once in three years. These revisions must be subjected to outside peer review before implementation. The process for such revisions should be streamlined and decentralized, with more autonomy for teachers, through a change in statutes wherever necessary. For existing systems often act as major impediments to a timely or speedy revision of curricula. There should be some mode of censure for departments or universities that do not upgrade their courses regularly. It needs to be recognised that it is very difficult to introduce new courses or innovative courses in universities because of departmental divides. Appropriate institutional mechanisms should be put in place to resolve this problem.

Assessment :

The nature of annual examinations at universities in India often stifles the teaching-learning process because they reward selective and uncritical learning.

There is an acute need to reform this examination system so that it tests understanding rather than memory. Analytical abilities and creative thinking should be at a premium. Learning by rote should be at a discount. Such reform would become more feasible with decentralized examination and smaller universities. But assessment cannot and should not be based on examinations alone. There is a clear need for continuous internal assessment which empowers teachers and students alike, just as it breathes life back into the teaching learning process. Such internal assessment would also foster the analytical and creative abilities of students which are often a casualty in university-administered annual examinations. To begin with, internal assessment could have a weight of 25 percent in the total but this should be raised to 50 percent over time.

Course Credits :

The present system is characterised by too many rigidities and too few choices for students. Universities that are smaller, or run semester-based systems, are obviously more flexible. Even in large universities, however, it is necessary to introduce greater diversity and more flexibility in course structures. This would be the beginning of a transition to a course credit system, where degrees are granted on the basis of completing a requisite number of credits from different courses. Every student should be required to earn a minimum number of credits in his/ her chosen discipline but should have the freedom to earn the rest from courses in other disciplines. It is essential to provide students with choices instead of keeping them captive.

Research :

We attempted to create stand-alone research institutions, pampered with resources, in the belief that research should be moved out of universities. In the process, we forgot an essential principle. There are synergies between teaching

and research that enrich each other. And it is universities which are the natural home for research. What is more, for universities, research is essential in the pursuit of academic excellence. It is time to reverse what happened in the past and make universities the hub of research once again. This would need changes in resource-allocation, reward-systems and mindsets. Substantial grants should be allocated for research. The provisions of these grants should be competitive and the criteria for these grants should be different from the usual criteria for non-plan and plan grants.

Faculty :

There must be a conscious effort to attract and retain talented faculty members. This is necessary because talented students who are potential faculty members have choices that are far more attractive in other professions in India or in the academic profession outside India. It is necessary to provide working conditions in the form of office space and research support combined with housing. But it may not be sufficient. This must be combined with some incentives and rewards for performance. There is, however, another dimension to the problem. Universities do not always choose the best in part because of native-son/daughter policies which leave them to select their own former students. This tends to lower quality and foster parochialisation in universities. Therefore, cross-pollination between universities should be encouraged. It may be worth introducing a ceiling, say one-half or even one-third, on the proportion of faculty members than can be hired from within the university. This would almost certainly engender greater competition and more transparency in faculty appointments.

Finances :

There is a serious resource crunch in universities which leaves them with little financial flexibility. In general, about 75 percent of maintenance expenditure is on salaries and pensions. Of the remaining 25 per cent, at least 15

percent is absorbed by pre-emptive claims such as rents, electricity, telephones and examinations. The balance, less than 10 percent, is not even enough for maintenance let alone development. Laboratories and libraries languish while buildings crumble. But that is not all. In most universities, plan (investment) expenditure is less than 5 per cent of non-plan (maintenance) expenditure. Such a small proportion of investment in total expenditure can only mortgage the future. It is doing so. The time has come for some strategic thinking on the re-allocation of budgets for universities with some allocation for development grants and on needs other than salaries. The criteria for resource allocation should seek to strike a much better balance between providing for salaries/ pensions and providing for maintenance/ development/ investment. These criteria should recognise the importance of a critical minimum to ensure standards and strategic preferences to promote excellence.

Infrastructure :

The elements of infrastructure that support the teaching-learning process, most directly, need to be monitored and upgraded on a regular basis. This means attention particular attention to libraries and laboratories, in addition to class rooms, sports facilities and auditoriums. It is imperative that universities provide broadband and connectivity to all students and teachers in campuses. In parallel, information technology systems should be used for admissions, administration and examinations along with other relevant web services for campus communities. And, as soon as possible, a digital infrastructure for networking universities should be put in place.

Governance :

There is an acute need for reform in the structures of governance of universities. The present system is flawed. On the one hand, it does not preserve autonomy. On the other, it does not promote accountability. The autonomy of

universities is eroded by interventions from governments and intrusions from political processes. This must be stopped. At the same time, there is not enough transparency and accountability in universities. This must be fostered. It is exceedingly difficult to provide generalized prescriptions. Some steps, which would constitute an important beginning, are clear. First, the appointments of Vice Chancellors should be based on search processes and peer judgment alone. These must be freed from direct or indirect intervention on the part of governments. Once appointed, Vice Chancellors should have a tenure of six years, because the existing tenure of three years in most universities and five years in central universities is not long enough. Second, the size and composition of University Courts, Academic Councils and Executive Councils slows down decision-making processes and sometimes constitutes an impediment to change. University courts, with a size of 500 plus, which are more a ritual than substance, could be dispensed with. Large academic councils do not meet often. Even when they meet, decisions are slow to come. Thus, standing committees of academic councils, which are representative, should be created for frequent meetings and expeditious decisions. The Vice-Chancellor should, then, function as a chief executive officer who has the authority and the flexibility to govern with the advice and consent of the executive council which would provide checks and balances to create accountability. Third, experience suggests that implicit politicisation has made governance of universities exceedingly difficult and much more susceptible to entirely non-academic interventions from outside. This problem needs to be recognised and addressed in a systematic manner not only within universities but also outside, particularly in governments, legislatures and political parties.

Undergraduate Colleges :

Undergraduate education, which accounts for about 85 percent of the enrolled students, is the largest component of our higher education system. It is

imparted through colleges where students enroll for first degrees in Arts, Science or Commerce. There are a total of about 17,700 undergraduate colleges. Of these, a mere 200 colleges are autonomous. The rest, as many as 17,500 colleges, are affiliated to, or constituent in, 131 universities. On average, each university has more than 100 affiliated colleges, but there are some universities each of which has more than 400 affiliated colleges. This system of affiliated colleges for undergraduate education, which may have been appropriate fifty years ago, is neither adequate nor appropriate at this juncture, let alone for the future. It is cumbersome to manage. And it is difficult to ensure minimal academic standards across the board. The problem has at least three dimensions. First, it imposes an onerous burden on universities which have to regulate admissions, set curricula and conduct examinations for such a large number of undergraduate colleges. The problem is compounded by uneven standards and geographical dispersion. Second, the undergraduate colleges are constrained by their affiliated status, in terms of autonomy and space, which makes it difficult for them to adapt, to innovate and to evolve. The problem is particularly acute for undergraduate colleges that are good, for both teachers and students are subjected to the 'convoy problem' insofar as they are forced to move at the speed of the slowest. There is also a problem for undergraduate colleges that are not so good, or are poor, because universities cannot address their special needs or unique problems. Third, it is difficult to set curricula and assess performance for such a large number of students where there is such a large dispersion in performance at school before entering college. This reality tends to make courses less demanding and examinations less stringent across the board. In fact the design of courses and examinations needs to be flexible rather than exactly the same for large student communities. There is an urgent need to restructure the system of undergraduate colleges affiliated to universities. In doing so, it is important to make a distinction between undergraduate colleges that already exist and undergraduate colleges that will be established in the future. It is also

important to remember that undergraduate colleges are afflicted by problems which are very similar to those that afflict universities. The most obvious solution is to provide autonomy to colleges, either as individual colleges or as clusters of colleges.

2.4.1 Recommendations on School Education (dated 3rd February, 2008)

As you have repeatedly emphasized, ensuring quality school education to all is the foundation upon which any further advances towards a knowledge society must be based. Noting the crucial importance of school education, the National Knowledge Commission (NKC) held a series of workshops and consultations around the country involving a very wide range of stakeholders, to discuss issues of quantity, quality and access in school education. NKC recognizes that the primary responsibility for school education is borne by the state governments, and therefore any policy changes must be with the full participation and involvement of the States. Nevertheless, NKC believes that positive changes in systems of schooling will require the active involvement of the central government as well state governments, not only in the matter of providing resources but also in promoting organizational and other changes. We have a number of suggestions and recommendations covering the different aspects of school education, but the essential thrust can be summarized as follows by Sam Pitroda, Chairman, National Knowledge Commission.

1. **Central Legislation for the Right to Education, backed by Financial Commitment**

NKC endorses the speedy enactment of a central legislation that will ensure the right of all children in the country to good quality school education up to the age of fourteen, supported with financial commitments of the central and state governments. This obviously requires substantially increased public spending for both elementary and secondary school education, which must be

seen as a priority area for spending. Currently school education is highly segmented, even in government run institutions, as a result of the parallel track of "education centres" in some states. These separate systems must be integrated to give all children access to schools of acceptable quality, which will obviously require additional spending.

2. More Flexibility in Disbursal of Funds

However, there is a strong case for changes in the manner in which such expenditure is incurred. The current norms for central government disbursal to states of funds for, including for Sarva Shiksha.

3. Letter on School Education

National Knowledge Commission Abhiyan (SSA), the planned SUCCESS program for secondary education and other central schemes, are too rigid and must be made more flexible. NKC strongly recommends a system of funds transfer and accounting that will allow for regional and other differences as well as changing requirements over time, and thereby allow state governments to use the resources in the most effective way. There should also be greater flexibility in disbursing funds down to the school level and a greater degree of autonomy of local level management in the use of funds. The norms and rules should allow schools to adapt to local conditions and meet particular requirements of their students.

4. Decentralization and Greater Local Autonomy

Community participation is an important instrument to ensure accountability and improve the day-to-day functioning of schools. This in turn means that the management of schools, including the use and management of funds, should be decentralized to local authorities as far as possible, whether they be panchayats, Village Education Committees or municipalities, and to School Boards that have representation of all stakeholders including parents.

5. Expansion of Functional Literacy

NKC would like to stress the continuing importance of a focus on expanding functional literacy among the population. Illiteracy remains a major problem, even among the age-group 15-35 years, and therefore literacy programmes must be expanded rather than reduced, and given a different focus that is directed towards improving life skills and meeting felt needs, especially (but not only) among the youth.

6. Planning for School Infrastructure

It is important to remember that land is an essential requirement of schools, and this requirement is likely to increase in the near future given the expansion implied by demographic changes and need to ensure universal schooling. Therefore urban master plans and local development plans must explicitly incorporate the physical requirements for schooling, including provisions for play grounds and other school facilities.

7. Enabling and Regulating Mechanisms for Private Schools

Since private schools play an important role in the provision of education, there is need for both enabling and regulating mechanisms to be developed and strengthened for them. There should be transparent, norm-based and straightforward procedures for the recognition of private schools, to reduce harassment and bureaucratic delay. There should also be transparent criteria as for the disbursement of aid from the government to some self-financing schools, especially those which cater to underprivileged children, and clear norms with respect to the ability of school managements to raise resources from other sources. The monitoring of private schools, in terms of ensuring a transparent admissions process, regulation of fee structures, as well as meeting minimum set standards for quality of teaching and infrastructure, also requires attention. The possibility of greater exchange between schools, including mentoring of one school by another, should be allowed and encouraged.

8. Database on School Education

Educational planning and monitoring are made much more difficult because of the lack of comprehensive and accurate data on schools, school-age children and actual attendance of both students and teachers. The collection and speedy dissemination of accurate and current data on schooling must be made a priority. It is necessary to create a complete database on schools and school-age children so as to track the actual coverage and quality of schooling at different levels, and to make it widely available in a timely manner. Such data collection may be made an essential part of the fund allocation for school education, with appropriate institutional mechanisms.

9. More Co-ordination between Departments

The multiplicity of management structures and government departments that currently governs schooling creates confusion, unnecessary replication and possibly inconsistent strategies across different schools. There must be greater co-ordination between different departments of government on school education policy, even while ensuring more autonomy to the local management of schools.

10. National Evaluation Body for Monitoring Quality

Educational administration also needs to be more conscious of actual learning outcomes at different levels, which will determine both policy and functioning. NKC therefore proposes a national evaluation body to monitor the quality of both government and private schools, using a results based monitoring framework based on a short list of monitorable criteria that include both process and outcome indicators.

11. Revamping School Inspection

The system of school inspection needs to be revamped and revitalized, with a greater role for local stake holders and greater transparency in the system. The solution does not lie in simply expanding the system – rather, we

need to develop systems to ensure meaningful monitoring, including provision of greater facilities to school inspectors, a separation of inspection of qualitative and administrative aspects, transparency in the criteria of inspection, and greater involvement of local stakeholders.

12. Teachers and Teacher Training

Teachers are the single most important element of the school system, and the country is already facing a severe shortage of qualified and motivated school teachers at different levels. It is urgent to restore the dignity of school teaching as a profession and provide more incentives for qualified and committed teachers. Non-teaching official duties such as electoral activities should not be allowed to interfere with the teaching process. Forums that allow and encourage teachers to exchange ideas, information and experiences, including a web-based portal, should be developed. At the same time, there should be transparent systems for ensuring accountability of school teachers. As far as possible, teachers should be recruited to particular schools. The training of teachers is a major area of concern at present, since both pre-service and in-service training of school teachers is extremely inadequate and also poorly managed in most states. Pre-service training needs to be improved and differently regulated in both public and private institutions, while systems for in-service training require expansion and major reform that allows for greater flexibility system, especially at Board level but also earlier

13. Reforms in the Curriculum and Examination System

Curriculum reform remains a critically important issue in almost all schools. School education must be made more relevant to the lives of children. There is need to move away from rote-learning to understanding concepts, developing good comprehension and communication skills and learning how to access knowledge independently. This also requires substantial changes in the examination.

14. Use of Information and Communication Technology

Wherever feasible, ICT should be made more accessible to teachers, students and administration for learning, training, research, administration, management, monitoring, etc. This requires the provision of more facilities such as computers as well as connectivity and broadband facilities. Computer-aided learning also requires training of teachers and other staff in order to make the best use of the technology.

15. English Language Teaching

Proficiency in English is widely perceived as an important avenue for employment and upward mobility, which also greatly facilitates the pursuit of higher education. The incorporation of English into the curriculum through the teaching of English as a language in Class I and teaching of one other subject in English medium in later classes requires making pedagogical changes to contextualize language learning, increasing the availability of English language teachers and providing more bilingual and supplementary teaching materials. At the same time, mutlilinguality must be promoted and language issues must be explicitly taken on board in designing school curricula and methods of pedagogy.

16. Interventions to ensure Access of Educationally Deprived Categories

Special interventions are necessary to ensure greater access to education of educationally deprived categories, and some proposals for this are developed in more detail in the accompanying Note.

2.4.2 Quantity and Resources

1. Substantially increased public spending is required for both elementary and secondary education

As we have already stated in two previous letters, we strongly endorse the speedy enactment of a central legislation that will ensure the right of all children

in the country to good quality school education up to the age of fourteen. We also believe that this should be extended to cover universal schooling up to the age of sixteen as soon as possible.

2. **Urban planning and local planning must explicitly incorporate the physical requirements for schooling, including provisions for play grounds and other school facilities**

It is important to remember that land is an essential requirement of schools, and this requirement is likely to increase in the near future given the expansion required by demographic changes and the need to ensure universal schooling. In the context of rapid urbanization, it has been found that urban conglomerations often come up without adequate provision for ensuring the physical space required for schools in the vicinity. This is particularly a problem in new settlements with quickly increasing density of population, not only in large cities but also in smaller towns and fast growing villages. This makes it difficult to establish schools where required, and to ensure that schools are able to provide all the necessary facilities including sports fields, etc. It is essential that the urban land use policies and regulations in all states and municipalities explicitly factor in the physical requirements of schools in areas of a certain population density. Similarly in rural areas, there must be adequate provision for land for setting up schools in areas that surpass a certain population density. In rural areas with low population density, difficult terrain or extreme climatic conditions, the government may consider the setting up of residential schools, which could also address the problem of migrant labourers and nomadic populations.

3. **The norms for central government disbursal to states of Sarva Shiksha Abhiyan (SSA) funds and other central schemes for school education are too rigid and must be made more flexible**

The current system of funds transfer and the accounting rules create

unnecessary rigidities that often do not allow the state governments to use the money in the most efficient or desirable way, and also lead to less than complete utilization of the budgetary allocation. Some of these problems include :

- very rigid norms on unit costs and what is allowed in terms of spending, that do not recognize the diverse requirements of different states or particular regions;

- inadequate financial provisions for infrastructure such as buildings etc, especially for some states and cities, which leads to the creation of poor quality infrastructure;

- an inflexible accounting system that does not allow transferring funds across heads to meet particular or changing requirements, and therefore inhibits full utilization and also prevents synergies from developing;

- insufficient allocation for repair and maintenance of infrastructure;

- treating rural and urban schools in the same manner even though the requirements are often very different (for example, urban government schools may require different infrastructure and facilities in order to attract students);

- treating all districts and geographical areas in the same manner regardless of the degree of backwardness, topographical conditions, etc. (This is especially a problem for schools in hilly or heavily forested areas or those with poor physical connectivity, for which per capita allocations are the same as for other more accessible areas);

- problems in the timing of fund transfer, as well as uncertainties in fund provision created by the insistence on matching funds and the fact that plan ceilings keep changing every year.

4. There should be greater flexibility in disbursing funds down to the school level and a greater degree of autonomy of local level management in the use of funds

Even within the states, the norms for fund disbursal and the requirements are often very time consuming and breed delays and unnecessary rigidities. There should be recognition of differences in per capita resource requirement according to particular criteria, such as geographical and spatial characteristics, the presence of children with special needs, seasonality and other features. In addition, there is a strong case for providing greater autonomy to local level management of schools, including locally elected bodies, school boards, Village Education Committees, etc., in the use and management of funds, subject to some overall criteria. Within the stipulated norms for expenditure, there should be scope for greater flexibility in the use of funds in response to local needs and local innovation.

5. There should be transparent, norm-based and straightforward procedures for the recognition of private schools, as well as for the disbursement of aid from the government to self financing schools and the ability of school management to raise resources from other sources

Private schools play a significant role in dispensing school education. It is estimated by NUEPA that around 15 per cent of schools in the country are privately owned and managed, while in some urban areas, private schools cater to a very large proportion of school going children. Their role must be recognized, and those providing quality education should be encouraged, especially when they cater to less privileged children.

However, many private schools have identified the time-consuming procedures for renewal of recognition from the government, which have to be undertaken at relatively frequent intervals, as a source of harassment.

It is necessary to simplify the rules and reduce the multiplicity of

clearances required for private schools, by developing a modality for coordinated point of clearance as far as possible. There is also a case for increasing the time period for which recognition is granted to such schools, especially those with a proven track record. Transparency in dealings between the government and private schools will also be aided if the information on rules and criteria for registration and the results of all school applications for granting of recognition are made public in an accessible form, including by making the relevant information available on websites.

Those charitable schools that provide quality education to children from underprivileged and marginalized sections of society deserve encouragement, and may be considered for receipt of government resources, according to transparent and norm-based procedures. However, all mechanisms of government aid disbursement to privately run schools should be transparently conducted and according to defined norms. There is a widespread perception that government rules currently reduce the ability of school managements to raise resources from other sources for the expansion of infrastructure or to provide other facilities.

This varies across states, but in general in most states the current system does allow schools to raise funds from donations, resources extended from the panchayat and other sources. However, it is important to ensure that the available flexibility for school management to raise resources should be widely known and publicized. In addition, innovative methods of raising additional resources could be allowed and encouraged. For example, schools, particularly in urban areas, could use assets such as buildings during non-school hours to generate additional funds to improve the quality of facilities.

6. Illiteracy remains a major problem, and therefore literacy programmes cannot be ignored or given less importance. Expenditure on the National Literacy Mission must be expanded rather than reduced, and given a different focus

The shift in policy focus from the National Literacy Mission (NLM) to the Sarva Shiksha Abhiyan has led to a declining emphasis on the need to ensure universal functional literacy. However, according to the 2001 Census, a significant proportion of the population - nearly half of all females and one-quarter of males - remains functionally illiterate. According to the NSSO, a significant proportion of households in 2004-05 (more than a quarter in rural India and nearly ten per cent in urban India) have no literate member.

7. Early childhood education is extremely important and must be universalized

There are two aspects to ensuring the universalization of early schooling and pre-school education. The first is the systematic extension of balwadis with trained staff to handle child pedagogy. The second is the provision for one year of pre-schooling in all institutions of elementary education. Both of these have implications for resource allocation and recruitment of the requisite staff.

8. The collection and speedy dissemination of accurate and current data on schooling must be made a priority

It is necessary to create a complete database on schools and school-age children so as to track the actual coverage and quality of schooling at different levels, and to make it widely available in a timely manner. Such data collection may be made an essential part of the fund allocation for school education, with appropriate institutional mechanisms

India has an extensive and regular mechanism of data collection for primary education. However, its methodology and use leave much to be desired.

For example, at present there is no reliable method for establishing which children are in schools. The process of data collection must be streamlined, made less time consuming and more relevant.

- A comprehensive mapping is required of schools and children of school-going age, so as to have accurate information on which children in which localities are enrolled, and attending which schools, as well as those not enrolled. This would also map out localities where there are high rates of dropout and/or non-enrolment.

- A tracking mechanism for all school children should be set up, to track their individual school going status, and progress in school. This tracking should cover both government schools and private schools. This would ensure universal access for children in all locations, as well as for girls and specific categories. A tracking mechanism will also facilitate checking for drop-outs and related problems, and allow for speedy intervention to address such problems. It should be noted that there are already ongoing initiatives in this regard in some states, which can be replicated and scaled up.

- Data collected for the purposes of planning must provide all the relevant information. This is also important with respect to information on infrastructure provision : for example the number of rooms should also mention whether these are electrified; where availability of toilets is described, there should also be information on the availability of water in the toilets.

- Safeguards must be instituted against "creative readjustment" of data, which is a common problem given the structure of incentives and the fact that the data are most often provided by the teachers or school management. This requires that data should be collected by independent agencies as far as possible, or necessarily subject to frequent and random cross-checks.

- ICT must be integrated for data collation and management, wherever required. A local area network with digital entry provisions could be set up to make it easier for the teachers and others who provide and use the data.

- The data thus collected must be freely available and easily accessible, provided on dedicated websites in addition to the usual means of publication.

- More specialized micro-level surveys and research should be commissioned. There should also be attempts to bring together other relevant research for easy access by practitioners.

2.4.3 Quality and Management

Currently school education is highly segmented, even in government-run institutions, as a result of the parallel track of "education centres" in some states. These separate systems must be integrated to give all children access to schools of acceptable quality. This will require additional spending.

In a number of states, funds under various schemes (SSA, EGS and AIE) were used to create "Education Centres" (Shiksha Kendras) rather than proper schools. These typically involve "teachers" who are essentially local women who have just passed Class VIII (or even Class V in some cases) and are paid between Rs. 1000 to Rs. 3000 per month in the different states. They typically receive no training or a 2-week training at best, and may have to teach multi-grade classes often in single rooms. The proportion of children in such schools varies very widely, but the all–India average amounts to around 16 per cent of total enrolment in primary education, according to the Planning Commission. All such children are described in the official statistics as enrolled in schools, even though going to an Education Centre cannot be treated as school enrolment on par with the proper schools, and such instructors do not meet the required norms for teachers. Currently state governments allow these parallel (and deeply unequal) systems of schooling to continue to be run by different departments –

"proper schools" by the Education department, and education centres under the panchayats and therefore by the Panchayat Department. The need to integrate these two parallel systems must be explicitly recognized. This requires special budgetary allocations for upgradation and quality improvement of the Education Centres through better infrastructure, as well as intensive training of existing teachers and additional employment of adequate numbers of qualified teachers - all of which will have financial implications.

At the same time, planning for school education must take into account the ecology of education – the need to adjust school systems to agro-climatic and other local variations

This requires flexibility with respect to school timings, vacations, teacher recruitment – but without sacrificing quality. Norms for schools must recognize the possibility of regional and local differences as well as the particular requirements of certain communities, such as nomadic groups, tribal communities, short-term migrant households, etc.

1. School Management must be Decentralized as Far as Possible

Decentralization of the management of schools, combined with community participation, is the most effective instrument for ensuring accountability, improving the day-to-day functioning of schools and allowing for flexible responses to local requirements. Therefore, there should be devolution of authority to local levels, whether to panchayats, Village Education Committees or municipalities. School Management Committees that include representatives of all stakeholders, including parents and teachers, should be empowered to make many decisions. Social audits of schools should be supported and encouraged.

There is a multiplicity of management structures and government departments in the administration of school education. This creates confusion, unnecessary replication and possibly inconsistent strategies across different

schools. There must be greater co-ordination between different departments of government on school education policy, even while ensuring more autonomy to the local community in matters of day to day management of schools

Currently schools are run or funded and monitored not only by the central and state governments, but also by different departments within state governments – the Education Department, the Panchayat Department, the Department for Tribal Welfare, the Department for Minority Welfare, etc. This creates overlapping and conflicting structures of authority, an excess of bureaucratic tangles, unnecessary replication of some activities (and even replication of enrolment in some cases!), different guidelines and differential standards for acceptable quality and other sorts of confusion. For example, in the rural areas of several states, the local Panchayati Raj Institution (PRI) run parallel to the SSA-run Village Education Committee (VEC). The exact remit of each is not clear and the policy intentions of both become diluted in the process. It is necessary to make systematic efforts to integrate or at least co-ordinate the activities of these separate management structures. The precise roles and responsibilities of each local level and state level department should be clearly specified, but even more than that, there should be some sort of pressure for these different bodies to work together as far as possible and provide a common and equal schooling. Education policy must be part of the integrated framework of decentralized planning. In the day-to-day management of schools, it is also necessary to work towards segregating teachers from managers in the school administration. At the same time, as noted above in point I.4, the decentralization of authority is critical in improving and maintaining the quality of education. Therefore, the local level management of schools, including locally elected bodies, school boards, Village Education Committees, must be allowed a significant degree of autonomy in handling matters relating to their schools, including not only the exact allocation of funds, but also other matters relating to school functioning and monitoring of teachers, etc.

There is need for a national body to monitor the quality of both government and private schools, to ensure that minimum standards are met in terms of learning outcomes

Currently there is no systematic and continuous feedback on the actual impact and outcome of various educational schemes and initiatives, or the actual quality of education imparted in schools. There is a strong case for a testing body at the national level for quality assessment of schools. A results-based monitoring framework with due process indicators and outcome indicators needs to be evolved. This should be based on a short list of monitorable criteria. These should include fixed infrastructural requirements, enrolment and attendance, as well as outcome indicators such as learning levels achieved in certain basic areas such as language skills and numeracy, etc. Such a process of assessment needs to be applied to all schools – both public and private. However, the testing of students must not involve topics or questions that provide any incentives for rote learning.

The tracking mechanism should ideally be concerned with the profile of skill attainment of each student. Since school education is largely a state subject, but it is also important to achieve minimum schooling norms at the national level, the institutional framework for this could be at the national level with state subsidiaries. The role of this testing body will simply be to provide information on the results of its assessments, with the state governments free to act upon this information.

The results of such regular tests must be made publicly available in a format accessible to all, including websites. The monitoring of private schools, in terms of ensuring a transparent admissions process, regulation of fee structures, as well as meeting minimum set standards for quality of teaching and infrastructure, also requires attention. There is currently no exact data on the numbers and enrolment of unrecognized private schools in the country, their fee structure or admissions policy, or their standards of infrastructure and quality.

Private schools should become the subject of regulation and inspection within a set framework which is universally applicable.

2. The system of school inspection needs to be revamped and revitalized in most states, with a greater role for local stakeholders

The current inspection system is overburdened and inadequate, with a small number of inspectors required to cover a large number of schools, often spread over wide physical areas. The solution does not lie in simply expanding the system rather, we need to develop systems to ensure meaningful monitoring. We recommend that the strategy for the revitalization of the school inspection system should include the following :

- Local stakeholders should be involved in the monitoring of schools, whether in the form of village education committees, parent associations, or other such bodies.
- The number of inspectors needs to be increased in many states, and they must be provided
- The facilities to undertake their activities properly, such as transport, communications devices, etc.
- The inspectors themselves must be accountable to the stakeholders of the area, through appropriate checks and balances.
- The criteria for inspection, the dates on which inspection of particular schools has taken place and the results should be made publicly available, including by posting on websites.
- The monitoring and inspection of schools must be separated from school administration, as the two functions require completely different orientations.
- The criteria for inspection should include not only infrastructure, facilities and teacher presence but also minimum standards for quality.

3. The dignity of school teaching as a profession must be restored, and at the same time there should be transparent systems for ensuring accountability of school teachers

Teachers constitute the basic foundation of the school education system. However, there is a general decline in morale among school teachers, especially those in primary schools, and consequently it is no longer seen as an attractive profession for qualified young people. Two types of public perceptions, also propagated in the media and among officialdom, contribute to the low morale among school teachers : first, that anyone can teach and no particular pedagogical skills or training are required; second, that in any case most teachers do not work much and are frequently absent from school. While the latter may be the case for a relatively small minority of teachers, most school teachers are committed to their profession even if they have to function under very difficult conditions. However, they are also subject to many other pressures such as political pressure and obligations to perform non-teaching duties, which can prevent them from fulfilling their teaching duties adequately. It is essential to ensure that qualified teachers are hired and provided with the necessary incentives to enable them to work better. The professional status of teachers should not be diluted, and all drives at recruiting untrained teachers must be checked, although it is important to allow for flexibility in recruitment of teaches for specific subjects such as art, craft and livelihood skills. The use of para-teachers must be treated as a strictly transitional measure until proper schools are established. The imposition of a wide range of non-teaching duties, such as that of manning poll booths and collecting data for surveys etc., cuts into the available teaching time and also undermines the professional status of teachers.

These activities should be shared out among a wider range of public employees or even those hired specifically for the purpose, and the burden of such work on teachers must be reduced. Specifically, unemployed local youth

and recently retired people may be considered for such activities as far as possible. The recruitment of teachers from the locality has many advantages, as they can become accountable to the community, and have added stakes in improving the quality of education in their schools. In cases where local language or dialect is different from the state language, teachers familiar with the local language are likely to make better teachers.

At the very minimum, school teachers should be appointed to a particular location for a minimum fixed term of at least five years, since a major problem cited by many teachers in the government school system is that of frequent transfers. (The specific case of attracting teachers to remote and backward areas is considered below under Access.) There should be increased attempts to improve public recognition of the contribution of school teachers, through various incentives such as more local, state-level and national awards, etc. It is necessary to monitor the emoluments and working conditions of teachers in private schools, which vary substantially, and prevent exploitation of teachers by private school employers as far as possible.

However, in addition to improving the working conditions of teachers, it is also necessary to institute measures to provide greater accountability of school teachers not only to their superiors, but to students, parents and the local community. Currently, any mention of increasing teacher accountability is viewed with hostility and suspicion by teachers themselves. Such an outlook needs to be changed. There is clearly need for greater accountability of teachers to the community and the school, and this will be facilitated by greater decentralization of school management to local stakeholders as has been suggested above. This should be accompanied by recognition of the concerns of teachers and allowing them more space to be active in school management and school activities. The actual administrative arrangements whereby this is done should be left to be decided at the state and local level. Systems of self-evaluation and peer evaluation of teachers should be encouraged.

4. The training of school teachers is extremely inadequate and also poorly managed. Pre-service training needs to be improved and regulated, while systems for in-service training require expansion and major reform in all states

Both pre-service and in-service teacher training programs face major problems at present, at the national level and in almost all states. With respect to pre-service training, there is a proliferation of private colleges awarding the B. Ed. degree, and these are inadequately monitored or regulated. A significant proportion of those who receive B.Ed. degrees do so through correspondence or distance learning courses, which involve absolutely no practical exposure. In any case, classroom experience is underplayed in standard B. Ed. courses. At the same time, the employment of *ad hoc* teachers and those without even high school diplomas as teachers in the parallel stream perpetuates the notion that it is not necessary for school teachers to have systematic and prolonged pre-service training. In-service training shows problems of inadequate quantity, uneven quality, outdated syllabi, and poor management.

5. It is important to develop and nurture leadership for managing schools

Even talented individuals who could be suitable for the tasks of school management need to be trained for this purpose. Such capacity building would create a pool of potential principals or heads. There a several ways in which this can be done. State governments could assign such training to existing institutions such as SCERTs or SIEs, leveraging the expertise available in Navodaya Vidyalayas, Kendriya Vidyalayas, other government schools and private schools. Such training programmes, as well as retraining programmes for existing principals, could also seek the expertise of specialists in management education. Also, individual mentoring programmes for school leaders could be evolved.

6. The possibility of greater exchange between schools, including mentoring of one school by another should be allowed and encouraged

The current system creates many distinctions and prevents interaction between schools. There is need to constitute mechanisms of exchange and interaction between students and teachers of different schools. In addition, schools that wish to do so should be allowed to exercise the option of being 'mentored' by another school to improve facilities and teaching methods.

7. Curriculum reform remains an important issue in almost all schools, school education must be made more relevant to the lives of children

There is need to move away from rote-learning to understanding concepts, good comprehension and communication skills and learning how to access knowledge independently

Successive commissions and committees set up by the government have emphasized the need to make the curriculum more interesting, relevant, creative and useful for students. The National Curriculum Framework 2005 also clearly articulated such an approach. Nevertheless it appears that in a majority of schools across the country, a significant emphasis on rote-learning and memorizing facts remains the norm. Also, there is evidence of children being overburdened with too much detail and an excess of scholastic requirements at the elementary level. It is important to orient students towards independent and continuous learning. This makes it essential to make greater efforts to change the attitude to learning and knowledge. It has been noted in several states that learning results have improved considerably upon providing inputs for communication and comprehension in language and basic mathematical skills using activity-based and imaginative pedagogical strategies.

8. Changes in the examination system are required, especially at board level but also earlier, to ensure that the pressure for rote-learning is reduced

The current over-emphasis on details, memorizing of facts and similar abilities rather than on understanding and accessing knowledge independently is reflected in the pattern of examinations. Board examinations in which marks are awarded based on the ability to recall lots of details or on rapidity of response or on the ability to do large numbers of sums in a limited period through practice in pattern recognition, are not sufficiently discriminatory and may end up providing misleading results. They also put pressure on schools to ensure that memory and pattern recognition skills are developed at the expense of genuine understanding.

9. New technologies, especially but not only ICT, should be used as much as possible to reduce costs, enable more effective use of resources, and provide wider exposure to students and teachers

The use of ICT as a teaching and learning device needs to be more firmly incorporated into the classroom. Both teachers and students need to be far more familiar with ICT, and get practical experience of web based research. Therefore ICT should be made more accessible to teachers, students and administration for learning, training, research, administration, management, monitoring, etc. This requires the provision of more facilities such as computers as well as connectivity and broadband facilities. Computer-aided learning also requires training of teachers and other staff in order to make the best use of the technology.

10. There is need for a web-based portal for teachers to exchange ideas, information and experiences

A forum for teachers needs to be developed where they may interact,

share experiences and ideas. This needs to be incorporated into teacher training programmes, and also provided generally for in-service teachers. A web-based teachers' portal can play an important role as such a networking forum.

2.4.4 Access

Special strategies are required to ensure greater access to schools in backward regions, remote locations and difficult terrains

There is a tremendous shortage of teachers and also great difficulty in ensuring minimum schooling infrastructure in some areas that have been historically deprived or have difficult topographical conditions. Distance and difficulty of physical access are important reasons for school dropout, especially in such areas. Sometimes it is also the case that such areas are inhabited by particular communities with their own language or dialect that is different from the state language. In order to ensure access to schools for children in such areas, special measures must be taken. NKC recommends the following measures for such areas :

1. Financial norms for schools in such locations must be different from those in more accessible areas, as they will require additional resource allocation based on particular conditions.
2. Special incentives, including a financial incentive (such as a "hardship bonus") need to be provided for teachers to take up jobs in such areas. Two different models may be considered – one based on recruiting local teachers on a permanent basis for a job in a particular school without transfer; and another based on a transfer policy that divides locations into hard/ middle/easy categories and allows teachers to rotate among them at specified intervals. Ideally, there should be at least one local teacher and one non-local teacher to ensure some variation, local acceptability and quality.
3. Residential arrangements must be made for teachers in such locations, by providing quarters next to or near the school. The cost of building such

quarters should be factored into the costs of the school building.

4. There are some geographical zones especially in mountainous regions, that are plagued by unique problems due to vast tracts of land, difficult topography, and a sparse and nomadic population. In such areas, well equipped residential schools should be set up instead of insisting on a school in every habitation. These schools must be equipped to look into the needs of very young children living away from their families.

A) Measures are required to ensure greater enrolment and retention of girl students :

The high dropout rate of girls especially from class V onwards is a matter of great concern. One major reason, as noted above, is the sheer lack of secondary schools nearby, as parents are reluctant to send girls to travel long distances to school. However, social conditioning and other constraints also play a role. Some policies to address this include :

- Special incentives for girls in secondary education where these are required (they are not required everywhere), in addition to free textbooks and uniforms, such as bicycles.
- Girls-only schools especially in particular areas.
- An enhanced scholarship scheme especially for girls, with particular emphasis on girls from socially deprived groups.
- The need for separate and functional toilets for girls in all schools, with access to water, is very important, especially but not exclusively in urban areas.

B) There is need to re-orient official strategies for ensuring better access of Muslim children to schooling :

Areas with Muslim majority population have tended to be overlooked in the implementation of government educational schemes. In addition, with a few

exceptions, there has been less private initiative in this regard. As a consequence, Muslims as a community, fewer government schools, girls schools, and higher educational institutions. It is important to rectify this gap and ensure adequate public expenditure to ensure that the physical and social infrastructure for schooling is made available. This means that the government should have a minority component in all its school development schemes and budget outlays, which should be in proportion to the minority population. The strategy cannot be based solely on more public resources provided to madrassas for their modernization, as according to the Sachar Committee Report, 96 per cent of Muslim children do not attend madrassas for schooling. Indeed, if the modernization of madrassa education is the only policy for increasing access for Muslim school children for a modernized education, it will only result in their being further isolated. It is important to ensure that children from all minorities and socially deprived groups are not discriminated against in the process of attending school. This must be an active and concerted campaign, in which syllabi and curriculum are checked to avoid prejudice, teachers are sensitized and instances of discrimination are punished. This also requires grievance redressal mechanisms at the school level and also at higher levels.

C) The access of children from scheduled tribes requires more flexible and sensitive schooling strategies :

Tribal children face problems of inadequate geographical access, discrimination at school and issues of language, which have been discussed earlier but are especially relevant in these cases. Tribal students have to compete with SC students, often at a disadvantage to the former. All of these must be addressed at the local level as well as at the district and state level. Every state should have an education policy for tribal and minority education, with a long term vision of eventual integration into the mainstream. Rather than setting up separate schools for those who have dropped out because they felt discriminated

against, teachers should be better sensitized to the needs of students from such communities, as well as the particular needs of first generation learners. The issue of language is particularly important in areas with tribal population, and care must be taken to find and train teachers who can deal with children in their own language, rather than forcing them to adjust to the regional language.

D) Education of SC children must be a priority, but with the required flexibility and avoidance of discrimination:

The points made earlier with respect to discrimination are especially valid also for SC children, and must be addressed in similar ways. In addition, scholarships should be increased and provided to much larger numbers of Dalit children, along with other provisions such as free textbooks up to class X and other incentives.

E) Children of seasonal migrants require special conditions and efforts to ensure continuous access to schooling :

Seasonal and short-term migration is a major cause for early drop outs and non enrolment. In order to ensure that such children have access to a quality and complete education, their economic insecurity has to be taken into account while formulating educational schemes. Tent schools and mobile schools must be made a part of the urban landscape for migrant children, while rural school also have to be made aware of the need to admit migrant children. This requires a significant change in the way that school admissions and enrolment are carried out, as well as greater sensitivity, flexibility and effort on the part of the school administration, all of which require hard and soft resources. It is necessary to identify good practices in this regard which can serve as a model to be emulated elsewhere.

F) Labouring children require incentives and bridge courses :

Some sort of monetary stipend may have to be paid to labouring children

to bring them into schools. In addition, synergies must be created with NREGA to look into school education concerns of labouring children. Pre-school systems like balwadis and anganwadis must be strengthened, so that a school going habit can be ingrained, as well as providing a space for small children to be cared for, while their elder siblings may go to school. Alternative Centres for Education must be utilized specifically to provide bridge courses aimed at different age groups and classes for drop outs. However, the use of Alternative Centres for Education must be no more than in a transition capacity. AIE should not become the only option for access to poor school children for a school education. Study Centres must be provided for first generation learners and seasonal migrants as a space which is more conducive to learning than what may be available at home. These may also be used as community centres, libraries, etc.

G) The needs of physically disadvantaged children, as well as teachers, have to be factored in more thoroughly in provisions for school education :

The goal in all schools should be inclusive education, which means that all systems must be oriented to allow the greatest possible access to children with different needs and abilities. This requires substantial changes in both infrastructure and pedagogical methods. School buildings must have provisions for access and navigation for the visually impaired, the physically handicapped, etc. Teacher must be trained, sensitized and empowered to deal with children with different abilities in the classroom situation. While this is the ultimate goal, it must also be recognized that current schooling patterns are not always conducive to bringing out the full potential of physically disadvantaged children, and that therefore there is still a case for special schools. There is a perception that government mechanisms may not be best suited to provide sustained and sympathetic support for learners with special needs and severely

disabled children (such as the blind). In this context, it may be better to identify appropriate and willing institutions outside the government who may become partners.

H) Language issues must be explicitly taken on board in designing school curricula and methods of pedagogy

Language has been found to be a highly alienating factor in the education of many school children, particularly amongst minorities, tribal communities with languages without a script, as well as linguistic minorities in most states. Many children resent the imposition of the state language as the medium of instruction, or as second language in school. More teachers for teaching minority languages must be appointed in government schools to increase intake of children from minority language communities. Qualified teachers from the local community and therefore speaking the same language must be recruited on a larger scale, as a means of encouraging retention amongst those who feel marginalized, as well as a means of bringing greater community control in the school. This would also act as a boost to confidence, and provide role models to students from disadvantaged backgrounds.

The teaching of English should be introduced along with the first language, starting from class I in school. Proficiency in English is widely perceived as an important avenue for employment and upward mobility, which also greatly facilitates the pursuit of higher education. The incorporation of English into the curriculum, through the introduction of English as a language in class I and the teaching of one other subject in English medium in later classes, requires pedagogical changes to contextualize language learning, increasing the availability of English language teachers and those who can teach at least one subject in English, as well as bilingual and supplementary teaching materials. At the same time, school education must commit to promoting multilinguality, given the multilingual nature of our country.

2.5 Indian Parliamentary and Scientific Committee Report, 1961 (Publications Division, Delhi, 1964)

Main Recommendations :

1. Science education in the primary schools should be introduced in the form of nature study. Not less than 25% of the lessons in the different languages readers could be devoted to science subjects in the form of stories, explaining the phenomena in nature as well as the lives of great scientists who have contributed to the making of the modern world. Such lessons should not, however, lack in literary presentation and grace to stimulate creative talent of the pupil. Use of visual aids, visits to botanical and zoological gardens and other methods of instructions have to be employed as far as feasible. Besides, in the reorganisation of syllabus for primary schools some science teaching has to be introduced in an elementary form.

2. General Science courses could be started in the middle schools, i.e. classes VI, VII and VIII.

3. At the high school stage science should be compulsory for all students, but it has to take the form of separate subjects as Mathematics, Physics, Chemistry, Biological Sciences, etc. along with the other humanistic subjects. Certain guidance in this connection could be offered by the way in which courses have been prescribed in the U. S. S. R. While formulating the courses it should be seen that there is a balance between the courses in science and courses in humanistic subjects and the one does not outweigh the other. This should remove defects of early specialisation. Everyone who leaves the this School should be equipped with elements of science as well as of humanistic culture. Whether he goes into employment or further courses in higher education or junior colleges instruction or in courses of vocational education in the trade schools, polytechnics or various other

branches of vocational training which will expand as our economy progresses.

4. A decision will have to be taken regarding the nature of the higher secondary stage. If the trend is to follow the recommendations of the Sampurnanand Committee, it will be possible to have new institution of junior colleges or intermediate colleges attached to the colleges or high schools or independent with a 2-year curriculum consisting of the 11th and 12th classes. In that case, specialisation in science could be started at this stage for those students who would go in for professional courses of medicine, agriculture, engineering or degree courses like B. Sc. and M. Sc. in science itself. The courses will have to be, perhaps, of the same nature as adopted for the VI form in U. K. where boys spend at least 2 years, but very often 3 years in doing courses at advances level for admission to the universities and other institutions of higher training.

5. Specialisation at an early stage of school education should be avoided and courses of instruction should be so framed as to enable those who come out of the high school at the age of 16 plus or 17 after completing 10 years of schooling either to pursue an occupation or train.

In 1961 recommendations on science education was very significant. Reports regarding laboratory and equipments revealed the following facts for improvement of science education :

1. Functional environments for science education.
2. Laboratory and equipment for facilitating science education.
3. Details infrastructural environments for laboratories.
4. Socio-economic condition to be considered for improving practical laboratories.
5. Details about size, shape and other conditions to maintain a good laboratory.

2.5.1 Report on Science Laboratories and Equipment in Higher Secondary Schools in 1962 by Panel Committee on Plan Projects, New Delhi, 1961

Main Recommendations :

1. Since the main function of a laboratory is to impart scientific education in an efficient way, its design should, therefore, be based on functional requirements.

2. The Panel considers that in the interest of economical distribution of lay-out and services, it would be advisable to locate the laboratories for Chemistry and Home Science on the ground floor and those for Physics and Biology on the first floor over these laboratories if the school buildings have a double-storied structure. For a single-storied structure, the grouping of Home Science with Chemistry and of Biology with Physics may still be kept intact. Both Chemistry and Home Science laboratories require special lay-outs for water and drainage which will be best arranged if they are both on the ground floor and adjacent to each other.

3. The Panel is of the view that all the four laboratories, viz. Physics, Chemistry, Biology and Home Science could be of the same size, i.e. 10.0 m × 6.0 m = 60 sq. m. (32' × 20' – 640 sq. ft.) with a space of 6.0 m = 60 m × 3.7 m = 22.2 sq. m. (20' x 12' – 240 sq. ft.) provided for ancillaries for each laboratory. The Panel feels that the space requirement of 60 sq. m. for a batch of 24 students is the minimum that could be recommended for each laboratory.

4. The factor of light, apart from affecting visual and physical comfort of students, involves the question of economy also in respect of the size and type of windows and of the disposition of light fittings. The chief purpose of lighting is to provide comfortable visual observation for laboratory work

and the conservation of vision of the young workers. It is desirable to make maximum use of day-light by proper location of doors, windows and skylights. Windows are best placed at a standard height of 1.2 m (4 ft.) from the finished floor level, as this would give a good distribution of light over the work tables whose height may vary between 85 cm. and 90 cm. (2'-9" and 3'). To save on capital as well as recurring expenses artificial lighting needs to be provided only for occasional work. Windows and doors should be so disposed as to provide as evenly distributed illumination as possible. A window area of 20 per cent of the floor area is considered to be adequate for general laboratory work. In terms of lumens per sq. ft. is considered to be adequate. The following reflectance standards are recommended for obtaining a desirable brightness level inside the laboratories :

Ceilings — 85% of the total amount of light received by the surface.

Walls — 60% of the total amount of light received by the surface.

Floors — 15% to 30% of the total amount of light received by the surface.

5. Light and colour are closely inter-related so that in determining a suitable colour scheme inside the laboratory, the reflectance value should always be taken into account. White is not considered suitable for laboratory walls as it causes glare and shows dirt very prominently. Light cream or silver grey be preferable.

6. Work table is the most important item of laboratory furniture and needs careful consideration. The Panel, after careful consideration of the functional requirements, makes the following recommendations :

   a) Size of the work table need not be the same for all the four laboratories since the work carried out differs in each case.

   b) Work tables in the Physics, Chemistry and Home Science laboratories need not have drawers or closed cupboards. Biology tables, however,

may preferably be provided with drawers. In Physics laboratory the work tables may me provided with 2 ft. wide intermediate shelves about 1 ft. above the floor level.

c) Provision for tables should be made for 24 students in each laboratory.

7. The committee strongly recommended that accommodation such as storage and balance room must form an essential part of the laboratory itself and should be well-planned in the same manner as the laboratory.

8. The panel feels that laying down of specifications and standards for equipment and apparatus will greatly improve the quality of instruments at present being supplied to schools and recommends that the necessity for making these specifications may be brought to the notice of the Indian Standard Institution and the Central Scientific Organisation with the request that they may expedite the laying down of standards of at least those items of science apparatus which are already being manufactured in the country.

9. The panel made a detailed study of the cost involved in equipping the various laboratories and recommended that the procurement of equipment and apparatus for a school which was to introduce science subjects afresh may be spread over a period of three to four years. In the case of a school which is already imparting instruction in these subjects, the requirements will vary with reference to the available equipment and need for future development within the limits of the panel's list.

2.6 Examination Committee Report, 1957 (U. G. C., New Delhi)

Summary of Recommendations :

1. No reform in the system of examinations will reduce the failure rate in our universities and colleges, unless the prevailing admission procedures are improved. We have therefore, to see that only those candidates are admitted

to universities who can profit by higher education. One of the feasible ways by which this could be done is to introduce in the School Leaving Examination two additional papers, one to test competence in the use of the language of the university and one to test intellectual maturity, for those who wish to enter the university.

2. Teaching work should be done not only through lectures but through tutorials, seminars, etc. It will be desirable to hold periodical short tests on the work done in the tutorials and to maintain a record of the assessments made. This should be regularly evaluated. Each university may decide what weightage should be given to this. In order to make room for tutorials, lectures may be cut down (it should be possible to reduce them by 50 per cent) and the teaching work divided between tutorials and lectures.

3. The U. G. C. should encourage seminars, discussions and conferences of university and college teachers for defining the objectives of teaching and examinations in different subjects at various levels. A clear conception of the aims of teaching will facilitate good teaching and bring about a greater conformity between examinations and teaching.

4. Research should be undertaken in regard to both the educational and technical aspects of examinations. Topics which may be taken up for research in this connection are indicated in the report. It should be possible for the departments of education in universities to undertake such work as a part of their normal activities. Perhaps the newly created National Council of Educational Research and Training would also be able to assist in this. There should be arrangement in the University Grants Commission to coordinate the research work of the different universities and to disseminate information and conclusions with regard to the studies undertaken.

2.7 Committee Report on Examinations, 1970 (National Council of Educational Research and Training, New Delhi 1971)

In 1970's the examination situation was not proper. Some malpractices were reported in different parts of India, where West Bengal, was also not an exception. But in 2005–2006 the overall situation changed and it was almost fair. The present researcher, though not interested about the examination situations of the hall, but simultaneously it can not be avoided because in secondary schools in West Bengal, evaluation technique is based on summative approach where examination environment and other technical factors are quiet important.

Summary of Recommendations :

1. Legislation :

The State and Central Governments should immediately take suitable measures to get amending legislation passed in the relevant laws pertaining to the following matters :

a) Empowering the Board / University to grant autonomous status to well established institutions.
b) Empowering the examining authorities to check students and prohibit those with weapons from entering the examination halls.
c) Making the assembly of persons within a certain distance from an examination hall a cognisable offence.
d) Making the indulgence in malpractices by employees and authorities of the universities / boards a cognisable offence.
e) Empowering the examining authorities to take out insurance for the invigilators and examiners.
f) Making the assault on an examiner or an invigilator or other person connected with examination, a cognisable offence.

2. Conduct of Examination :

a) Paper-setters should be appointed at least six months prior to the commencement of a Public Examination and they should be given at least eight weeks to draft questions. The papers should be finalised at a meeting of the paper-setters.

b) Where the number of candidates in Public Examination is very large, there should be decentralisation with separate examination for each group of 10,000 school students or 1,000 college students.

c) A Public Examination should be conducted in the institution in which the students study. The majority of the invigilators and superintendents should be drawn from the institution concerned.

d) Admission to the centre of a Public Examination should be through one main entrance. Only bonafide candidates with identity cards should be admitted in the examination centre after thorough checking.

e) Model answers should always be prepared and supplied by the paper-setters.

f) Copies of the question papers set should be made available to the teachers in the schools and colleges on the day of the examination but after it is over, so that the teachers could comment on the paper to the authorities quickly.

g) The method of spot evaluation at a central place to which all the examiners are called, should be adopted.

h) The result should be declared subject-wise and furnished in the form of grades. The 'raw' marks given on the candidates passing in the minimum number of subjects.

i) The certificate issues by an examining authority should have two columns, viz. one giving the result of Public Examination and the other giving the result of the internal assessment by the teachers.

j) For the awarding of prizes and scholarships to a candidate who stands first in an examination or in a subject, a separate test should be conducted and admission to the same limited to those who secure the highest grade in the

Public Examination.

k) There should not be too many Public Examinations. There should be one at the end of the upper primary / middle school stage, another at the end of the secondary stage and the third at the first degree stage. All others should be internal assessments only.

3. Use of Examination Results :

a) A recruitment to the services should be made on the basis of tests / examinations conduced by the Public Service Commissions and the maximum age for appointment for clerical posts be reduced to 19 years.

b) Admission to colleges including professional colleges should be on the basis of an entrance test conducted specifically for assessing the aptitude of a student for a particular course. Eligibility to appear at these tests should alone be determined by the results of the Public Examination.

4. Budgeting for Education :

In future, both the Central and State Governments should make funds separately for guidance and studies and research on examinations.

5. Research :

There should be continued study and research on examinations, both at the State and Central levels and in the boards / universities in a coordinated manner. Necessary funds for the same should be provided on a priority basis.

6. Novel Ideas :

Novel ideas for the organisation and conduct of Public Examinations should be encouraged.

2.8 Committee Report on School Buildings, 1970 (Ministry of Education, Government of India, New Delhi, 1972)

Main Recommendations :

1. The committee has estimated that Rs. 90 crores will be required for the additional buildings for the primary and secondary schools started during the Fourth Plan. The Committee has also estimated that Rs. 250 crores will be required for clearing the backlog of school buildings required for primary and secondary schools started before the commencement of the Fourth Plan. The Committee has assumed that 50 per cent of the amount required for the construction of school buildings will be available through popular contribution. The Committee urge the Government of India to set apart Rs. 10 crores per annum for the next ten years as grants to the State Governments specifically for construction of school buildings. If necessary, half of this amount may be given as loan and the rest as grant.

2. In order to mobilise local resources for school buildings, the following steps are recommended :
   i) The committee strongly recommends that the funds collected by the different States through lotteries may be utilised for educational purposes including the capital costs on buring the sale of the lottery tickets.
   ii) Local people may be asked to donate one or two rooms at the time of birthdays, marriages and such other occasions and if so desired, the name of the donor could be inscribed on the room / rooms donated by him / her.
   iii) Public meetings may be arranged and an appeal could be made by a number of speakers for donations for the construction of school buildings.
   iv) A drive should be made to get the religious institutions to donate some buildings as a part of their programme.
   v) Other avenues like staging plays and organising exhibitions may also be explored for the purpose of raising funds for school buildings.

vi) Contributions in kind, e.g. surplus cement and surplus food for paying for the labour in kind may also be accepted.

3. The Committee recommends that the programme of construction of school buildings may be planned in the following order of priorities :

(i) Buildings for those schools where classes are held in the open (Information received from States/ Union Territories at Annexure X);

(ii) Places where classes are conducted in tents;

(iii) Schools having rented accommodation;

(iv) Repairs, maintenance and improvements (additional rooms, etc.) in existing schools.

The possibility of providing tents to schools where classes are being held in the open till buildings can be provided should also be explored.

Though the examination committee report on 1957 was for higher education appointed by U. G. C. but some recommendations may be fruitful on secondary level also. Specially the formative approach in evaluation system may be introduced in the present secondary level to upgrade the present system.

2.9 Curriculum Studies and Examination System

Curriculum analysis or studies is necessary by virtue of its centrality to two important tasks performed by teachers and administrators : curriculum selection and curriculum adaptation. When selecting or adapting a curriculum for use in a particular classroom, school or school systems, it is important to determine whether or not it is appropriate for the situation. This determination is not limited to an analysis of such matters as the reading difficulty, the quality and accuracy of content, and the amount of additional training required for implementation. This scanning also requires the ability to determine the extent to which the assumptions underlying the curriculum are valid for the particular class remaining in the existing school set ups. These assumptions consist of tacit

beliefs about the central purpose of education, about the intended audience (students, teachers, parents etc.) and the way the people learn, about the teachers and the best ways to teach, about the subject matter and how it should be organized, and about the community and what it values; or about to what extent it will be feasible in the school setting for all types of learners of differing ability and cultural tools of learning. Posner things that an understanding of these sort of these sorts of beliefs is at the heart of reflective eclectism. Uncovering these sorts of beliefs requires probing beneath the surface of the document of the curriculum framework, reading between lines and making inferences on the basis of scattered evidence and reflection. Thus curriculum studies or analysis is more like a detective work or intellective discourse than clerical work. Once you learn how to do a thorough and complete work, you will have internalized a basic sense of the enterprise and even some of the steps.

Curriculum studies may be looked as one kind of content analysis of the curriculum documents and therefore, you will have to put into actions and steps required in content analysis as a kind of methodology of research.

Finally, with these sorts of activities, thinking, orientations, techniques, etc. when you will be able to internalized, you will be an active team member of a curriculum group.

2.9.1 Curriculum Studies / Analysis Questions

On the basis of the above mentioned discussion we may now think of a tool that may be useful for a novice student who intents to perform curriculum studies. This tool or inventory has been devised by George J. Posner in context of curriculum analysis. However, it will be equally useful here :

1. How is the curriculum / curriculum framework documented ?

- On what documents and other resources will you base your study and analysis ?
- What limitations in document do you find ?

2. What situation resulted in the development of the curriculum ?

- To which social, political, or educational problems was the curriculum attempting to respond ?
- What planning elements dominated the curriculum development process ?
- What theory, or model is the pillar of development of the curriculum ?

3. What perspectives do the curriculum represent ?

4. What are the purposes and content of the curriculum ?

- At what does the curriculum expresses its purpose ?
- What educational goals, educational aims and educational objectives are emphasized and what are their relative priorities ?
- What learning objectives are included and emphasized in the curriculum ?
- What is the main nature of content organization in the curriculum ?
- What are the primary ways in which the curriculum represents the subject matters in the students ?

5. What assumptions underlie the curriculum approach to purpose or content ?

- What conceptions of learning, objectives, curriculum and teaching underlie the materials you are analyzing ?
- What aspects of a hidden curriculum are likely to accompany the conceptions and perspectives underlying the curriculum ?

6. How is the curriculum organized ?

- What organizational principles are employed ?
- What provision is made for micro-level vertical / or horizontal organization ?

7. What assumptions underlie the curriculum organization ?

- What epistemological assumptions underlie the curriculum's organization ?

- What psychological assumptions underlie the curriculum's organization ?
- What other assumptions underlie the curriculum's organization ?
- What assumptions underlie modifications of curriculum with respect to textbooks, media use, learning climate and teacher training ?

8. How shall the curriculum be implemented ?

- What are the temporal, physical, organizational and political – legal requirements of the curriculum ?
- What are the portable costs and benefits associated with the curriculum change / renewal ?
- To what extent will the curriculum be consistent with and appropriate for the teacher's attitudes, beliefs and competencies ?
- What values are embedded in the curriculum, and how well are these values likely to be suited to the curriculum ?

9. What is your judgment about the curriculum ?

- What are its strengths and weaknesses ?
- Of what dangers would you want to be careful if your implement it ?
- Of what changes would you want to be looked forward ?

2.9.2 Common Elements of a Curriculum Framework :

A curriculum framework refers to a broad map of a curriculum which presents the curriculum work in precise way but does not generally explicitly the all ramifications of the learning tasks to be operated when it will be implemented in the real world of classroom. Every curriculum framework is expected to exhibit some essential elements in the framework documentation.

1. Introduction – Current Context :

It provides a rationale of the curriculum framework.

2. Educational Policy :

It provides a conceptual support of the Governments policy on education, inclusion of ICT, meeting the challenges of global trends, development of skills, improving the universal literacy and to create a productive knowledge society.

3. Learning Objectives :

Describes what students know and be able to do when they complete their curricula. Outcomes should be expressed in different domains, including knowledge, understanding, skills, and competencies, values and attitudes.

4. Structure of the Education System :

Describes the school system within which the curriculum framework is to be applied :

- Number of schooling including compulsory schooling. Stages of schooling and their durations.
- Number of weeks in the school years and hours or teaching periods in the school week.

5. Structures of Curriculum Content, Learning Area and Subjects :

Describes the organization of content within the framework and the extent to which schools and students can make choices.

- The pattern of subjects or learning areas to be studied in each stage or cycle such as core, elective and optional subjects.
- A brief description of each subject or learning areas outlining the rationale for inclusion in the curriculum and the contribution to the achievement of learning outcomes.

6. Standard of Resources required for implementation :

Teacher's qualification, Teaching load. Students-involvement and activities Materials-textbooks, computers, other equipment, facilities in classroom.

7. Teaching Methodology :

Description in the range of teaching approaches that might be employed in the implementation of the framework.

8. Assessing Student Achievement :

Describing the importance of assessing the extent to which students achieve the outcomes of each subject, and recommends types of assessment strategies such as written, oral, performance, and practical or dissertations.

2.9.3 National Curriculum Framework – 2005 by NCERT

Plan and pay attention to systemic matters that will enable us to implement many of the good ideas that have already been articulated in the past. Paramount among these are :

- Connecting knowledge to life outside the school,
- Ensuring that learning is shifted away from rote methods,
- Enriching the curriculum to provide for overall development of children rather than remain textbook centric,
- Making examinations more flexible and integrated with classroom life and,
- Nurturing an identity soaked in caring concerns within the democratic polity of the country.

In the present context there are new developments and concerns to which our curriculum must respond. The foremost among these is the importance of including and retaining all children in school, through a programme which reaffirms the value of each child and enables all children to experience dignity and the confidence to learn. Curriculum design must reflect the commitment to Universal Elementary Education (UEE), not only in representing cultural diversity, but also by ensuring that children from different social and economic backgrounds with variation in physical, psychological and intellectual characteristics are able to learn and achieve success in school.

A) Quality Dimension – Centrality of Renewal :

Quality is the first and the last mantra of the national curriculum framework. The late J. P. Naik had described equality, quality and quantity as the 'elusive triangle' of Indian education. Moreover, UNESCO's recently published global monitoring report discusses systematic standards as the appropriate context of the quality debate. Physical resources by themselves cannot be regarded as an indicator of quality; yet, the extreme and chronic shortage of physical resources, including basic infrastructural amenities, in school run by the state or local bodies does present a serious quality constraint. The availability of qualified and motivated teachers who perceive teaching as a career option applies to all sectors of schools as a necessary precondition for quality. Suggestions for the dilutions of standards in teacher recruitment, training and service conditions articulated in the NPE and, before it, by the Chattopadhyaya Commission (1984) arouse anxiety and commented that no system of education can rise above the quality of its teachers, and the quality of teachers greatly depends on the means deployed for selection, procedures used for training, and the strategies adopted for ensuring accountability.

The quality dimension also needs to be examined from the point of view of the experiences designed for the child in terms of knowledge and skills. Assumptions about the nature of knowledge and the child's own nature shape the school ethos and the approaches used by those who prepare the syllabi and textbooks, and by teachers.

No subject in the school curriculum can stay aloof from these larger concern, and therefore, the selection of knowledge proposed to be included in each subject area requires careful examination in terms of socio-economic and cultural conditions and goals. The greatest national challenge for education is to strengthen our participatory democracy and the values enshrined in the Constitution. Meeting this challenge implies that we make quality and social justice the central theme of curricular reform. Citizenship training has been an

important aspect of formal education. A clear orientation towards values associated with peace and harmonious co-existence is called for. Quality in education a concern for quality of life in all its dimensions.

B) Learning and Knowledge – Curriculum :

The formal processes of learning that school makes possible can open up new possibilities for understanding and relating to the world. The curriculum framework advocates for child-centered pedagogy. 'Child-centered' pedagogy means giving primacy to children's experiences, their voices, and their active participation. This kind of pedagogy requires us to plan learning in keeping with children's psychological development and interests. The learning plans therefore must respond to physical, cultural and social preferences within the wide diversity of characteristics and needs. Our school pedagogic practices, learning tasks, and the texts we create for learners, tend to focus on the socialization of children and on the 'receptive' features of children's learning. Learning is active and social in its character. Children's voices and experiences do not find expression in the classroom – often in our existing classroom. Hence the children will learn only in an atmosphere where they feel they are valued. Our schools still do not convey this to all children. The association of learning with fear, discipline and stress, rather than enjoyment and satisfaction is detrimental to learning.

The framework has pointed out the Common sources of physical discomfort which include – long walks for young children to reach school.

Heavy school bags; time-tables that do not give young children enough breaks to stretch, move and play, and deprives older children of play/sports time, and encourage girls to opt out.

The curriculum must have a holistic approach to learning and development that is able to give them active participation in learning.

C) Development and Learning :

As children's metacognitive capabilities develop, they become more aware of their own beliefs and capable of regulating their own learning. Further as active learners :

- All children are naturally motivated to learn and are capable of learning.
- Making meaning and developing the capacity for abstract thinking, reflection and work are the most important aspects of learning.
- Children learn in a variety of ways – through experience, making and doing things, experimentation, reading, discussion, asking, listening, thinking and reflecting, and expressing oneself in speech, movement or writing – both individually and with others. They require opportunities of all of these kinds of their development.
- Teaching something before the child is cognitively ready takes away from learning it at a later stage. Children may 'remember' many facts but they may not undersigned them or be able to related them in the world around them.
- Learning takes place both within school and outside school. Learning is enriched if the two areas interact with each other. Art and work provide opportunities for holistic learning that is rich in tacit and aesthetic components. Such experiences are essential for linguistically known things, especially in moral and ethical matters, to be learnt through direct experience, and integrated into life.
- Learning must be paced so that it allows learners to engage with concept and deepen understanding, rather than remembering only to forget after examination.
- Learning can take place with or without mediation. In this case the latter, the social context and interactions, especially with those who are capable, provide avenues for learners to work at cognitive levels above

others (NCF-2005, pp. 15 – 16).

D) Teaching for Construction of Knowledge :

In constructivist perspective learning is a process of construction of knowledge. A child constructs her / his knowledge while engaged in the process of learning. Quite often children have an idea arising from their everyday active engagement and learning various concepts, skills and positions through the process. Very often teachers, in government as well as private schools, insist that all children must give identical answers to questions. We must indeed, contemplate why we only ask children to give answers to questions.

Constructivist Learning Situation Process involves basically two elements – Interpretation construction and Multiple interpretation.

In this context, teacher is a facilitator who encourages learners to reflect, analyse and interpret in the process of knowledge construction.

Much of our school learning is still individual based (although not individualised!). The teacher is seen as transmitting 'knowledge' which is usually confused with information to children, and organising experiences in order to help children learn. Learning in the company of others is a process of interacting with each other and also through the learning task on hand. This kind of learning gets enriched when schools enroll children from different socio-economic backgrounds.

There are ways in which group learning can be assessed and evaluated. Schools could also consider giving mixed age groups of children projects to do together. In such mixed groups there is much that children can learn from each other such as team work and social values. Group learning tasks, taking responsibility, and contributing to a task on hand are all important facets of not only acquiring knowledge but also in learning of crafts and arts.

E) Designing Learning Experiences :

The quality of the learning task influences its learnability and its value for the learner. Learners accept being controlled and learn to want to control. Answer, we need to allow learners to spend time on deeper meaningful learning. Learning tasks are to be designed to ensure that children will be encouraged to seek our knowledge from sites other than the textbook.

This framework misses to spell out clearly the criteria for selecting learning experiences and their length and breadth as usually found in technical approach to curriculum development and design. In this aspect the framework seems non-technical.

F) Approaches to Planning :

Learning must be focused on activity. The learning experiences should be organized as :

- Observing something happen.
- Participating in an exercise involving body and mind such as planning a role around a theme and presenting it.
- Talking about and reflecting on something the child has experience.
- Making something, say, a system of gear wheel or trying out an experiment in a lift.
- After the experience, the teacher could organize a discussion, an exercise involving, writing, drawing and display, etc.

2.9.4 Knowledge and Understanding : Basic Capabilities of Learners

The curriculum needs to provide experiences that build the knowledge-base through a progressive introduction to the capabilities of thinking rationally, to understand the world through the disciplines, aesthetic appreciation, and sensitivity to others, to work and to participate in economic processes. This section discusses the nature and forms of knowledge and understanding as

necessary for making informed curricular choices and approaches to content.

Knowledge can be conceived as organised, through language, into patterns of thought (or structures of concepts), thus creating meaning, which in turn helps understand the world we live in. It can also be conceived of as patterns of activity, or physical dexterity with thought, contributing to acting in the world, creating and making of things. Human beings, over time, have evolved both a wealth of bodies of knowledge which includes a repertoire of ways of thinking, of feeling and of doing things and constructing more knowledge. It suggests that in the curriculum, there must be as much focus on the process of learning, on how learners engage with and reconstruct knowledge, as on the content of what is learnt.

Forms of Understanding :

Knowledge can be categorized based on distinct kinds of concepts and meanings involved and processes of validation and justification. Mathematics has its own distinctive concepts, such as prime number, square root, fraction, integral and function. The validation procedures of mathematics are never empirical, never based on observation of the world or on experiment, but are demonstrations, internal to the system specified by the appropriate set of axioms and definitions.

Scientific inquiry involves observation and experimentation to validate predictions made by theory (hypotheses), which may be aided by instruments and controls. Social Sciences and Humanities have their own concepts, for example community, modernization, culture, identity, and polity. Social Sciences aim at developing a generalized and critical understanding of human beings and human groups in society. The Social Sciences concern themselves with description, explanation and prediction in the social world. With regard to the process of knowledge formation, Science and Social Sciences are first, the Social Sciences study human behavior which is governed by ‘reasons’, while

the nature is governed by ‘cause-effect’. Second, findings of Social Sciences often raise issues of ethics and desirability while natural phenomena can be understood, raising ethical questions only when they enter into the domain of human action.

Art and aesthetics use quite familiar words, such as rhythm, harmony, expression. Art productions cannot be judged against reality or for ‘truth’. Ethics is concerned with all human values, and with the rules, principles, and standards.

In relation to action and choice, therefore, ethics must be conceded primacy over each of the forms of understanding. Furthermore, such reasons will be reasons for anyone; reason, equality and personal autonomy are therefore very intimately connected concepts.

Philosophy involves a concern on the one hand, with analytical clarification, evaluation and synthetic coordination of the aforementioned forms of understanding.

The basic capabilities, the knowledge of practice and the forms of understanding are the core ways in which human experience has been elaborated in the course of history. Imagination and critical thinking are linked in obvious ways with the development of understanding and reason, and so are the emotions.

Thus, the curriculum planners have reflected on cognitive constructivism, social constructivism, learning in situ, moral reasoning, metacognitive elaboration of one’s thought processes, problem-posing learning, collaborative learning, etc. and imagined to bring the appropriate exercise by the teachers in classroom learning.

CHAPTER – III

TEACHING LEARNING SYSTEM : CURRICULAR AREAS, ASSESSMENT AND EFFECTIVE CRITERIA OF TEACHING

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TEACHING LEARNING SYSTEM : CURRICULAR AREAS, ASSESSMENT AND EFFECTIVE CRITERIA OF TEACHING

The NCF–2005 in this chapter has reflected upon the changing order of knowledge and observed that this dynamic nature of knowledge production and application have not clearly addressed in school practices. It puts : "It is important that each curricular areas is revisited in depth, so that specific points of entry can be identified to the context of emerging social needs. In this respect, the status and role of the arts and health and physical education deserve special attention in view of the peculiar orbit of the 'extra-curricular' to which they were relegated almost a century ago. Aesthetic sensibility and experience being the prime sites of the growing child's creativity, we must bring the arts squarely into the domain of the curricular, infusing them in all areas of learning while giving them in an identity of their own at relevant stages. Work, peace, and health and physical education have a similar case. All three have a fundamental significance for economic, social and personal development. Schools have a major role to play in ensuring that children are socialized into a culture of self-reliance, resourcesfullness, peace-oriented values and health" (p. 35).

To sum up, the NCF-2005 has embraced eight areas of studies, such a Language, Mathematics, Science, Social Sciences, Art Education, Health and Physical Education, Work and Education, and Education for Peace.

The area-wise renewal directions may be presented in the following order.

Language

- Language skills – speech and listening, reading and writing – cut across school subjects and disciplines.

- A renewed effort for implementation three – language formula, emphasizing the recognition of children's home language or mother language (including tribal language if needed) as the best method of instruction.
- English needs to find its place along with other Indian languages.
- The multilingual character of Indian society should be seen as a resource for the enrichment of school life.

Mathematics

- Mathematization (ability to think logically, formulate and handle abstraction) rather than 'knowledge' of mathematics (formal and mechanical procedures) is the main goal of teaching mathematics.

Science

- Content, process, and language of science teaching must be commensurate with the learner's age – range and cognitive reach.
- Science teaching should engage the learners in acquiring methods and processes that will nurture their curiosity and creativity, particularly in relation to the environment.
- Science teaching should be placed in the wider context of children's environment to equip them with the requisite knowledge and skills to enter the world of work.
- Awareness of environment concern must permeate the entire school curriculum.

Social Studies

- Social science content need to focus on conceptual understanding rather than lining up facts to be memorized for examination, and should equip children with the ability to think independently and reflect critically on social issues.
- Interdisciplinary approaches promoting key national concerns such as

gender, justice, human rights, and sensitivity to marginalized groups and minorities.

- Civics should be recast as a political science, and the significance of history as a shaping influence on the children's conception of the past and civic identity should be recognized.

Work

- School curricula from the pre-primary stage to the senior secondary stage need to be reconstructed to realise the pedagogic potential of work as a pedagogic medium in knowledge acquisition, developing values and multiple skill formation.
- The art should compromise a subject at every stage of school curriculum.

Peace

- Peach-oriented values should be promoted in all subjects throughout the school years with the help of relevant activities.
- Peace education should form a component of teacher education.
- Peace education should form a component of teacher education.

Health and Physical Education

- Health and physical education are necessary for the overall development of learners.

Habitat and Learning

- Environmental education may be best pursued by infusing the issues and concerns of the environment into the teaching of different disciplines at all levels.

In this chapter special emphasis has been given in the area of teaching-learning of sciences as well as Social Sciences keeping in view the pluralistic

nature of Indian society. Hence, two important deliberations of NCF-2005 in relation to Social Sciences are being presented separately. Here the framework very loosely speaks for different subject matter integration but it does not state to what extent the inclusion of different aspects of integration of learning experiences would follow vertical, horizontal or spiral or wheel approach. Or in which way it will maintain continuity in organization of educational experiences.

3.1 Planning the Curriculum

For the primary grades, the natural and the social environment will be explained as integral parts of languages and mathematics. The languages used should be gender-sensitive. Teaching methods should be in a participative and discussion-oriented mode.

For classes III to V, the subject Environment Studies (EVS) will be introduced. Children will also begin to be sensitized to social issues like poverty, child labour, illiteracy, caste and class inequalities in rural and urban areas. The content should reflect day-to-day experiences of children and their life-words.

At the upper primary stage, Social Studies will be added-drawing its content from history, geography, political science. History will take into account developments in other parts of the world. Geography can help develop a balanced perspective related to issues concerning environment, resources and development at different levels, from local to global. In Political Science, the student will be introduced to formation and functioning of governments at local, state and central levels and the democratic processes of participation. At the secondary stage, Social Sciences comprise history, geography, sociology, political science, and economics. The focus will be on contemporary India and the learner will be initiated into a deeper understanding of the social and economic challenges facing the nation. In keeping with the epistemic shift

proposed, these will be discussed form multiple perspectives, including those of the adivasi, dalit and disenfranchised populations. Possible to the children's everyday lives. In History, India's freedom movement, and other aspects of its modern history can be studied, as well as significant developments in other parts of the world. History should help them discover processes of change and continuity in their world and to compare ways in which power and control were, and are exercised. Geography should be taught keeping in mind the need to inculcate in the child's critical appreciation for conservation and environmental concerns along with developmental issues. In Political Science, the focus should be on discussing the philosophical foundations that underlie the value-framework of the of the Indian Constitution, i.e. in-depth discussion of equality, liberty, justice, fraternity, dignity, plurality, and freedom from exploitation. The higher secondary sage is important as it offers a choice of subjects to the students. For some students, this stage may be the end of their formal education, leading to the world o work and employment; for others, the foundation for higher education.

They may choose either specialised academic courses or job-oriented vocational courses. A range of courses from social sciences and commerce may be offered and students may exercise their choice. Subjects need not be grouped into separate 'streams', and students should have the freedom to opt for subjects or courses according to their need, interest, and aptitude. The social sciences will include disciplines like political science, geography, history, economics, sociology and psychology. Commerce may include business studies and accountancy.

3.2 School and Classroom Environment

Main Areas of Renewal :

1. Availability of minimum infrastructure and material facilities, and support for planning a flexible daily routine, are critical for improved teacher

performance.

2. A school culture that nurtures children's identities as 'learners' enhances the potential and interests of each child.
3. Specific activities ensuring participation of all children.
4. The value of self-disciplining among learners through democratic functioning is as relevant as ever.
5. Participation of community members in sharing knowledge and experience in a subject area helps in forging a partnership between school and community.
6. Reconceptualization of learning process in terms of (a) textbooks focused on elaboration of concepts, activities, problems and exercises encouraging reflective thinking and group work, (b) supplementary books, workbooks, etc. based on fresh thinking and new perspectives, (c) multimedia and ICT as sources for two-way interaction rather than one-way reception, and (d) school library as an intellectual space for teachers, learners and members of the community to deepen their knowledge and connect with the wider world.
7. Decentralized planning of school calendar and daily schedule and autonomy for teacher professionalism practice are basic creating a learning environment.

3.3 Systematic Reforms of the Existing Curriculum

Main Areas of Reforms :

1. Quality concern, a key feature of systematic reform, implies the system's capacity to reform itself by enhancing in ability to remedy its own weakness and to develop new capabilities.
2. It is desirable to evolve a common school system for schooling of all sections and types of learners in the spirit of inclusion.
3. A broad framework for planning upwards, beginning with schools for

identifying focus areas and subsequent consolidation at the cluster and block levels, could for a decentralized planning strategy at the district level.

4. Meaningful academic planning has to be don in a participatory manner by headmasters and teachers.
5. Monitoring quality must be seen as a process of sustaining interaction with individual schools in terms of teaching-learning process.
6. Teacher education programme need to be reformed and strengthened so that the teachers can be an (a) encouraging, supportive and humane facilitator in teaching-learning situations to enable learners to discover their talents, to realise their physical and intellectual potentialities to the fullest, to develop character and desirable social and human-values to function as responsible citizens; and (b) active members of a group of persons who make conscious efforts for curricular renewal so that it is relevant to changing social needs and the personal needs of learners.
7. The NCF 2005 states : "Reformulated teacher education programmes that place thrust on the active involvement of learners to the process of knowledge construction, shared context of learning, teacher as a facilitator of knowledge construction, multidisciplinary nature of knowledge of teacher education, integration theory and practice dimensions, and management with issues and concerns of contemporary Indian society from a critical perspective".
8. Centrality of language proficiency in teacher education and an integrated model of teacher education for strengthening professionalization of teachers assume significance.
9. In-service teacher education needs to become a catalyst for change in school practice.
10. The Panchayati Raj system should be strengthened by evolving a mechanism to regulate the functioning of parallel bodies at the village level so that democratic participation in development can be realised.

11. Reducing stress and enhancing success in examinations necessity : (a) a shift away from content-based testing to problem solving skills and understanding, (b) a shift towards shorter examinations, (c) an examination with flexible time limit, and (d) setting up a single nodal agency for coordinating the design and conduct of entire examinations.
12. Institutionalization of work centered education as an integrated part of the curriculum from the pre-primary to the +2 stage is expected.
13. Vocational Education and Training (VET) needs to be conceived and implemented in a mission mode, involving the establishment of separate VET centres.
14. Availability of multiple textbooks to widen teacher's choice and provide for diversity in children's needs and interests.
15. Sharing of teaching experiences and diverse classroom practices to generate a new idea that facilitates innovation and experimentation.
16. Development of syllabi, textbooks and teaching-learning could be carried out in a decentralized and participatory manner involving teachers, experts from universities, NGOs and teachers' organization.

In short the research shows that student evaluations of a teacher provide a reliable, valid assessment of that instructor's teaching effectiveness, especially if they reflect the views of many students in several different course offerings (Felder, 2001).

Teaching Learning System according to Young-Shen-Chen based on teaching learning activities which requires constant effort of the teacher with their proper academic leadership. The structural presentation of the model is furnished below:

3.4 Economic Definitions of Effectiveness

In economics, concepts such as effectiveness and efficiency are related to

the production process of an organization. Put in a rather stylized form, a production process can be summed up as a 'turnover', or transformation of 'inputs' into 'outputs'. Inputs into a school or school system include pupils with certain given characteristics and financial and material aids. Outputs include pupil attainment at the end of schooling. The transformation process or throughput within a school can be understood as all the instruction methods, curriculum choices and organizational preconditions that make it possible for pupils to acquire knowledge. Longer-term outputs are denoted by the term 'outcomes' see Table 1.

Table 1 : Analysis of factors within the education production process

Inputs	Process	Outputs	Outcomes
Funding	Instruction methods	Final Primary school test scores	Dispersal on the labour market

Effectiveness can now be described as the extent to which the desired level of output is achieved. Efficiency may then be defined as the desired level of output against the lowest possible cost. In other words, efficiency is effectiveness with the additional requirement that this is achieved in the cheapest possible manner. Cheng (1993) has offered a further elaboration of the definitions of effectiveness and efficiency, incorporating the dimension of short-term output versus long-term outcomes. In his terms : technical effectiveness and efficiency refer to "school outputs limited to those in school or just after schooling (e.g. learning behaviour, skills obtained, attitude change, etc.)", whereas social effectiveness and efficiency are associated with "effects on the society level or the life-long effects on individuals (e.g. social mobility, earnings, work productivity)" (ibid, p. 2). If one combines these two dimensions, four types of school output can be distinguished (see Table 2).

Table 2 : Distinction between School Effectiveness and School Efficiency [Cited from Cheng (1993)]

Nature of School Input	Nature of School Output	
School input	In school / just after schooling Short-term effects Internal (e.g. learning behaviour, skills obtained)	On the society level Long-term effects External (e.g. social mobility, earnings, productivity)
Non-monetary (e.g. teachers, teaching methods, books)	School's societal effectiveness	School's technical effectiveness
Monetary (e.g. cost of books, salary, opportunity costs)	School's technical efficiency (internal economic effectiveness)	School's societal efficiency (external economic effectiveness)

It is vital for the economic analysis of efficiency and effectiveness to be able to express the value of inputs and outputs in terms of money. In order to determine efficiency, it is necessary to know the input costs such as teaching materials and teachers' salaries. When the outputs can also be expressed in financial terms, efficiency determination resembles a cost-benefit analysis (Lockheed, 1988, p. 4). It has to be noted, however, that a strict implementation of the above-mentioned economic characterization of school effectiveness runs up against many problems.

These begin with the question of how one should define the 'desired output' of a school, even if one concentrates on the short-term effects. For instance, the 'production' or returns of a secondary school can e measured by the number of pupils who successfully pass their school-leaving diploma. The unit of measurement is thus the pupil having passed his or her final

examination. Often, however, one seeks a more precise measurement, in which case it is relevant to look, at, for example, the grades achieved by pupils in various examination subjects. In addition, there are various choices to be made with regard to the scope of effectiveness measures.

3.4.1 Theoretical Views on Organizational Effectiveness

Organizational theorists often adhere to the thesis that the effectiveness of organizations cannot be described in a straightforward manner. Instead, a pluralistic attitude is taken with respect to the interpretation of the concept in question. By that it is assumed that the interpretation chosen depends on the organizational theory and the specific interests of the group posing the question of effectiveness (Cameron and Whetten, 1983, 1985; Faerman and Quinn, 1985). Therefore the main organizational models used as background for a wide range of definitions of effectiveness will be briefly reviewed.

3.4.2 Economic Rationality

The above-mentioned economic definition of effectiveness is derived from the idea that organizations function rationally – that is to say, with certain goals. Goals that can be operationalized as outputs to be pursued are the basis for choosing effect criteria (effect criteria being the variables used to measure effects, i.e. student achievement, well-being of the pupils etc.). There is evidence of economic rationality whenever the goals are formulated as outputs of the primary production process of the school. In the functioning of a school as a whole, other, different, goals can also play a part, such as having a clear-cut policy to increase the number of enrolments. Even with regard to this type of objective, a school can operate rationally, although it falls outside the specific interpretation given to economic rationality. Effectiveness as defined in terms of economic rationality can also be identified as the productivity of an organization. Tyler (1950) has provided the best-known example of the rational

or goal-oriented model, used for both curriculum development and educational evaluation.

3.5 The Organic System Model

According to this model, flexibility and adaptability are the most important conditions for effectiveness, i.e. for survival. School effectiveness may then be measured in terms of yearly intake, which could, in part, be attributed to intensive canvassing or school-marketing.

Niskanen (1971) demonstrated that public-sector organizations are primarily targeted at maximizing budgets and that there are insufficient external incentives for these organizations – schools included – to encourage effectiveness and efficiency. In this context it is interesting to examine whether canvassing activities of schools mainly consist of the displaying of acquired facilities (inputs) or of the presentation of output data such as the previous years' examination results.

Finally, it should also be mentioned that although the organic system model is inclined towards inputs, this does not necessarily exclude a concern for satisfying outputs. This may be the case in situations where the environment makes the availability of inputs dependent on the quantity and / or quality of previous achievements (output).

3.6 Modes of Schooling as Avenues for Improving Effectiveness

In the previous section it was established that the overall concept of school effectiveness may be defined differently depending on the normative criteria related to the various schools of thought in organizational science. This led to a discussion about the choice of criteria or types of 'effects' to be measured. Bearing in mind that school effectiveness is a causal concept, the dimension of causes or means should be taken into consideration as well as the type of effects.

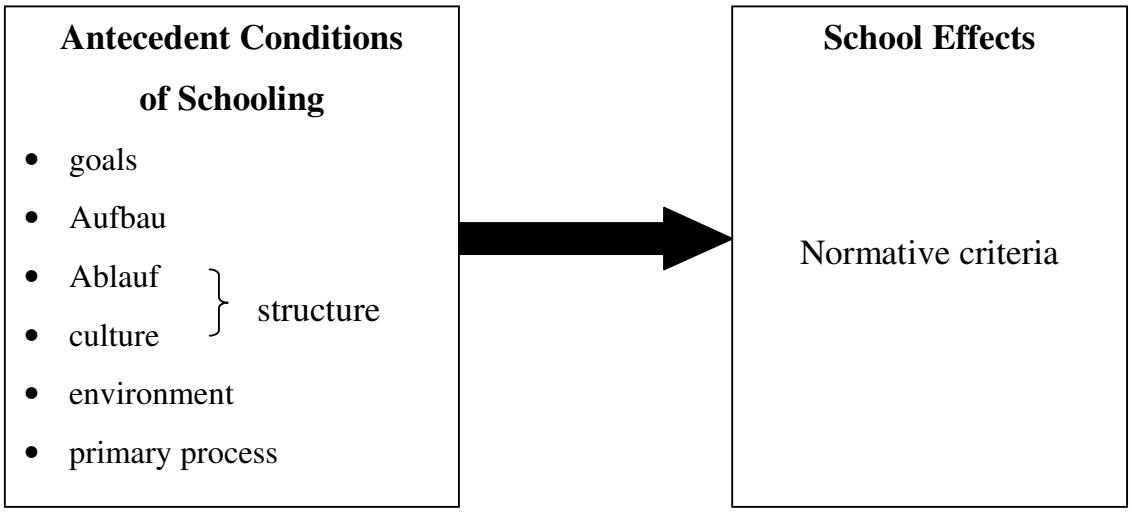
This involves the identification of all the malleable features of school functioning that might contribute to attaining the effects aimed for. Such a broad perspective is needed in order to obtain as complete a picture as possible of the elements and aspects of schooling and school functioning that could potentially be used to improve effectiveness.

Based on well-known distinctions in organizational science (Mintzberg, 1979; De Leeuw, 1982), the following categories can be used as a framework to further distinguish elements and aspects of school functioning :

- goals;
- the structure of positions or sub-units ('Aufbau');
- the structure of procedures ('Ablauf');
- culture;
- the organization's environment;
- the organization's primary process.

These antecedent conditions will be referred to as modes of schooling. Modes are considered as conditions that, in principle, may be manipulated by the school itself or by outside agencies that have control over the school. The overall effectiveness equation, consisting of antecedent conditions on the one hand and effects on the other, can be depicted in the following figure :

Schematic Representation of School Effectiveness



Among these modes, goals have a specific role. In organizational-effectiveness thinking, goals can be seen as the major defining characteristic of the effectiveness concept itself. In the previous section it was established that different goals, or effectiveness criteria, can be used to assess effectiveness.

Finally, one of the tasks of the organization may be considered to be ensuring that goals or attainment targets are shared among the members of the organization. This is particularly relevant for organizations such as schools, in which teachers traditionally have a lot of autonomy. In control theory the phenomenon of unifying the goals of organizational sub-units (i.e. departments and individual teachers, in the case of schools) is known as 'goal co-ordination'.

'Pupil selection' is a condition that would generally fall outside the definition of school effectiveness, since the specific interest in the value added by schooling, over and above the impact of the innate abilities of pupils, precludes the consideration of this option.

3.6.1 Modes of Schooling

Goals :

- goals in terms of various effectiveness criteria.
- priorities in goal specifications (cognitive – non-cognitive).
- aspirations in terms of attainment level and distribution of attainment.
- goal co-ordination.

Aufbau (position structure)

- management structure.
- support structure.
- division of tasks and positions.
- grouping of teachers and students.

Ablauf (structure of procedures)

- general management
- production management
- marketing management.
- personnel management (among which hrm, hrd)
- financial and administrative management
- co-operation

} planning, co-ordinating controlling, assessing

Culture

- indirect measures
- direct measures

Environment

- routine exchange (influx of resources, delivery of products)
- buffering
- active manipulation.

Primary process

- curricular choices
- curriculum alignment.
- curriculum in terms of prestructuring instructional process.
- pupil selection
- levels of individualization and differentiation
- instructional arrangement in terms of teaching strategies and classroom organization]

3.6.2 Improving School Effectiveness [Jaap Scheerens (2000)]

The results of the early effective-schools research converged more or less around five factors :

- strong educational leadership;
- emphasis on the acquiring of basic skills;
- an orderly and secure environment;
- high expectations of pupil attainment;
- frequent assessment of pupil progress.

In the literature this is sometimes identified as the 'five-factor model of school effectiveness'. In more recent contributions, effective-schools research has been integrated with education production function and instructional-effectiveness research, this meaning that a mixture of antecedent conditions has been included. Studies have evolved from comparative case studies to surveys, and conceptual and analytical multi-level modelling has been used to analyze and interpret the results. Numerous reviews on school effectiveness have been published since the late seventies. Examples are Purkey and Smith (1983) and Ralph and Fennessey (1983). More recent reviews are those by Levine and Lezotte (1990), Scheerens (1992), Creemers (1994), Reynolds *et al.* (1993), Sammons *et al.* (1995) and Cotton (1995).

The focal point of the reviews is the question of 'what works'; typically the reviews give lists of effectiveness-enhancing conditions.

There is fairly wide consensus in the reviews on the main categories of variables to be distinguished as effectiveness-enhancing conditions, even when one compares earlier with more recent reviews.

Table – 3 summarizes the characteristics listed in the reviews by Purkey and Smith (1983); Scheerens (1992); Levine and Lezotte (1990); Sammons *et al.* (1995) and Cotton (1995).

Table – 3 : Effectiveness-enhancing conditions of schooling in five review studies (italics in the column of the Cotton study refer to sub-categories)

Purkey and Smith, 1983	Levine and Lezotte, 1990	Scheerens, 1992	Cotton, 1995	Sammons, Hillman and Mortimore, 1995
Achievement-oriented policy	Productive climate and culture	Pressure to achieve	Planning and learning goals	Shared vision and goals
Co-operative atmosphere, orderly climate		Consensus, co-operative planning, orderly atmosphere	Curriculum planning and development	A learning environment, positive reinforcement
Clear goals on basic skills	Focus central learning skills		Planning goal learning goals school-wide emphasis on learning	Concentration on teaching and learning
Frequent evaluation	Appropriate monitoring	Evaluative potential of the school, monitoring of pupils' progress	Assessment (district, school, classroom level)	Monitoring progress
In-service training / staff development	Practice-oriented staff development		Professional development collegial learning	A learning organization

Purkey and Smith, 1983	**Levine and Lezotte, 1990**	**Scheerens, 1992**	**Cotton, 1995**	**Sammons, Hillman and Mortimore, 1995**
Strong leadership	Outstanding leadership	Educational leadership	School management and organization, leadership and school improvement, leadership and planning	Professional leadership
	Salient parent involvement	Parent support	Parent community involvement	Home-school partnership
Time on task, reinforcement, streaming	Effective instructional arrangements	Structured teaching, effective learning time, opportunity to learn	Classroom management and organization, instruction	Purposeful teaching
High expectations	High expectations		Teacher student interaction	High expectation
				Pupil rights and responsibilities
			District-school interactions	
			Equity	
			Special programmes	

Purkey and Smith, 1983	Levine and Lezotte, 1990	Scheerens, 1992	Cotton, 1995	Sammons, Hillman and Mortimore, 1995
		External stimuli to make schools effective		
		Physical and material school characteristics		
		Teacher experience		
		School context characteristics		

Scheerens and Bosker (1997, Chapter 4) provide an analysis of the factors that are considered to work in schooling, as apparent from the actual questionnaires and scales used in 10 empirical school-effectiveness studies.

Their summary in which the main components are mentioned, is cited below in Table – 4.

Table – 4 : Components of Effectiveness-enhancing Factors

Factors	Components
Achievement, orientation, high expectations	• clear focus on the mastering of basic subjects • high expectations (school level) • high expectations (teacher level) • records on pupils' achievement
Educational leadership	• general leadership skills • school leader as information provider

Factors	Components
	• orchestrator or participative decision-making • school leader as co-ordinator • meta-controller of classroom processes • time spent on educational and administrative leadership • counsellor and quality controller of classroom teachers • initiator and facilitator of staff professionalization
Consensus and cohesion among staff	• types and frequency of meetings an consultations • contents of cooperation • satisfaction about co-operation • importance attributed to co-operation • indicators of successful co-operation
Curriculum quality / opportunity to learn	• setting curricular priorities • choice of methods and textbooks • application of methods and textbooks • opportunity to learn • satisfaction with the curriculum
School climate	(a) Orderly atmosphere • the importance given to an orderly climate • rules and regulations • punishment and reward • absenteeism and drop-out • good conduct and behaviour of pupils • satisfaction with orderly school climate

Factors	Components
	(b) Climate in terms of effectiveness orientation and good internal relationships • priorities in an effectiveness-enhancing school climate • perceptions on effectiveness-enhancing conditions • relationships between pupils • relationships between teacher and pupils • relationships between staff • relationships : the role of the head teacher • pupils' engagement. • appraisal of roles and tasks • job appraisal in terms of facilities, conditions of labour, task load and general satisfaction • facilities and building
Evaluative potential	• evaluation emphasis • monitoring pupils' progress. • use of pupil monitoring systems. • school process evaluation. • use of evaluation results • keeping records on pupils' performance • satisfaction with evaluation activities
Parental involvement	• emphasis on parental involvement in school policy • contact with parents • satisfaction with parental involvement
Classroom climate	• relationships within the classroom • order

Factors	Components
	• work attitude • satisfaction
Effective learning time	• importance of effective learning • time • monitoring of absenteeism • time at school • time at classroom level • classroom management • homework

This research has been identified in the literature as 'process-product studies'. Variables which emerged 'strongly' in the various studies were the following (Weeda, 1986, p. 68) :

- clarity : clear presentation adapted to suit the cognitive level of pupils;
- flexibility : varying teaching behaviour and teaching aids, organizing different activities etc.;
- enthusiasm : expressed in verbal and non-verbal behaviour of the teacher;
- task related and / or business like behaviour : directing the pupils to complete tasks, duties, exercises etc. in a business like manner;
- criticism : much negative criticism has a negative effect on pupil achievement;
- indirect activity : taking up ideas, accepting pupils' feelings and stimulating individual activity;
- providing the pupils with an opportunity to learn criterion material – that is to say, a clear correspondence between what is taught in class and what is tested in examinations and assessments;
- making use of stimulating comments; directing the thinking of pupils to the

question, summarizing a discussion, indicating the beginning or end of a lesson, emphasizing certain features of the course material.

- varying the level of both cognitive questions and cognitive interaction.

In later studies effective teaching time became a central factor. The theoretical starting points of this can be traced back to Carroll's teaching-learning model (Carroll, 1963). Chief aspects of this model are :

- actual net learning time which is seen as a result of perseverance and opportunity to learn;
- necessary net learning time as a result of pupil aptitude, quality of education and pupil ability to understand instruction.

Doyle (1985) looked at the effectiveness of direct teaching, which he defined as follows :

- teaching goals are clearly formulated;
- the course material to be followed is carefully split into learning tasks and placed in sequence;
- the teacher explains clearly what the pupils must learn;
- the teacher regularly asks questions to gauge what progress pupils are making and whether they have understood;
- pupils have ample time to practise what has been taught, with much use being made of 'prompts' and feedback;
- skills are taught until mastery of them is automatic;
- the teacher regularly tests the pupils and calls on them to be accountable for their work.

The question of whether this type of highly structured teaching works equally well for acquiring complicated cognitive processes in secondary education as for mastering basic skills at the primary-school level has been answered in the affirmative according to Brophy and Good, 1986. Yet, in such settings, progress through the subject matter can be taken with larger steps,

testing need not be so frequent and there should be space left for applying problem-solving strategies flexibly. Doyle (ibid) emphasized the importance of varying the learning tasks and of creating intellectually challenging learning situations. These can be produced through an evaluative climate in the classroom, where risk-taking is encouraged, even with complicated tasks.

In the domain of classroom organization, Bangert, Kulik and Kulik's meta-analysis (1983) revealed that individualized teaching in secondary education hardly led to higher achievement and had no influence whatsoever on factors such as self-esteem and attitudes of pupils. 'Best-evidence-syntheses' by Slavin (1996) indicated a significantly positive effect of co-operative learning at the primary-school level.

Meta-analyses by Walberg (1984) and Fraser *et al.* (1987) found the most significant effects for the following teaching conditions :

- reinforcement;
- special programmes for gifted children;
- structured learning of reading;
- cues and feedback;
- mastery learning of physics;
- working together in small group.

3.7 Examples of School Process Indicators

Community Involvement

- the degree of actual involvement of parents in various school activities (the teaching and learning process, extra-curricular activities and supporting activities);
- the percentage of the total annual school budget that is obtained from the local community;
- the amount of discretion local school boards have concerning the working conditions of teachers.

Financial and Human Resources

- average years of teachers' experience per school;
- school-level pupil / teacher ratio;
- average class size per school;
- proportion of formally qualified teachers per school;
- school managerial 'overhead' (principal and deputy-principal per 1,000 students).

Achievement-oriented Policy

- whether or not schools set achievement standards;
- the degree to which schools follow the careers of pupils after they have left the school;
- whether or not schools report achievement / attainment outcomes to local constituencies.

Educational Leadership

- the amount of time principals spend on educational matters, as compared to administrative and other tasks;
- whether or not principals appraise the performance of teachers;
- the amount of time dedicated to instructional issues during staff meetings.

Continuity and Consensus among Teachers

- the amount of changes in staff over a certain period.
- the presence or absence of working groups or departments for different school subjects (secondary schools);
- frequency and duration of formal and informal staff meetings.

Orderly and Safe Climate

- statistics on absenteeism and delinquency;
- ratings of school discipline given by principals, teachers and pupils.

Efficient Use of Time

- total instruction time and time per subject-matter area;
- average loss of time per teaching hour (due to organization, moving to different rooms, locations, disturbances);
- percentage of lessons 'not given' on an annual basis.

Opportunity to Learn

- teacher or student ratings of whether each item of an achievement test was taught or not.

Evaluation of Pupil's Progress

- the frequency of curriculum-specific tests at each grade level;
- the frequency of standardized achievement tests;
- the actual use teachers make of test results.

Ratings of Teaching Quality

- quality of instruction as rated by peers (other teachers);
- quality of instruction as rated by students.

Table – 5 : Additional Factors for Process Indicators generated from the Quinn and Rohrbaugh Framework

Human Relations Model	Open System Model
• quality of work life indicators	• entrepreneurship
• respect	• collegiality
• participation in decision-making	• capacity for self-evaluation and learning
• professional interaction	• overt school marketing activities
• performance feedback	• parental involvement
• opportunity to use skills	• boundary-spanning positions
• resources	• external change gents
• congruence personal / organizational goals	• student enrolment figures
	• resources (buildings, equipment)

Internal Process Model	Rational Goal Model
• planning documents • disciplinary rules • management information systems. • formalization of positions • continuity in staffing and leadership • integrated curricula • attendance rates • lessons 'not given'	(School-effectiveness research) • educational leadership • success-oriented ethos • monitoring of student's progress • time on task • content covered (opportunity to learn) **Broader Set of Educational Goals** • non-gradedness • team teaching • individualization, differentiation • continuous learning route • time spent on social, emotional, creative and moral development. • 'learning to learn' activities • diagnostic testing

These three dimensions in the professional development of school leaders (content, delivery mode and measurement of success) can be found in recent reviews of the area. Ribbins (2000), for example, argues for an approach to school leader professional development which :

- is centrally concerned with improving the quality of schooling and the achievement of pupils;
- is systematic, comprehensive and of high quality;
- makes available continuing opportunities for every career phase;
- has a concern for practical skills but also for a more philosophical approach;
- involves a range of providers;
- provides core training, but supports development opportunities that mean more than this; and,
- is based on best available evidence and fosters research that generates this.

Another example is provided by Bredeson (2003) who proposes a set of design principles for expanding and legitimising learning opportunities for those in schools. Using the metaphor of architecture and building on empirical research and exemplary practice Bredeson (2003) identifies six design themes :

- professional development is about learning, including teachers and principals being part of its design;
- professional expertise is a journey, not a credential;
- opportunities for professional learning are unbounded;
- student learning, professional development and organisational mission are intimately related and
- professional development is about people, not programs and activities.

The proposed stages and dimensions can also be found in two major cross-country studies of the professional development of school leaders. It is to these two studies that we now turn before concluding the paper with some possible implications arising from the material presented.

1. Achieving the heightened expectations of schools

1.1 Consider broadening what counts for effective education beyond academic achievement to include areas such as student engagement, participation and self-concept and community social capital (that is, to areas that have greater predictive validity for later life successes). Is, for example, failure considered a necessary part of learning ?

1.2 Better reconcile decentralisation with overall system quality. The degree of detail with which schools are held to account needs to be reviewed, for example, if priorities need to be set should the focus be on outcomes and / or procedures ? If the focus is to be outcomes then consideration should be given to the evidence indicating that some forms of outcomes, for example those involving standardisation, have been found to harm teaching and learning as well as re-stratify education by race and class.

1.3 Explore more seriously whole-of-government (cross-agency) approaches to meeting the heightened expectation of schools.

1.4 Review role responsibilities and levels of administrative support for principals to ensure that their priority is educational leadership, for example, that they are provided with time and space to become leaders, rather than plagued with bureaucracy, such as endless circulars and regulations. Do they, for example, have sufficient authority and flexibility conferred upon them to enable them to fully discharge their ever-challenging responsibilities ?

1.5 Review school leader appointment processes and criteria to ensure they reflect the new demands being made of them. For example, check that school leaders have the ability and time to build teams, for example :

- to involve and negotiate with all stakeholders in order to establish a clear vision for the school to which all the constituents have 'signed up';
- to effectively manage communications and perceptions (different strategies are required for different stakeholders); and,
- to engage in evidence informed monitoring, practice and policy.

1.6 Consider appointing school leaders for fixed periods, including exploration of the attractiveness or otherwise of :

- contracts of employment, e.g., that provides tenure to a teaching position but contracts to all post of responsibility;
- transfer to another school after a period in one school (say 7 years);
- periodic time away from the school context to undertake research sabbaticals or purposeful secondments (including in business and / or industry, especially where it can be reciprocated);

- joint appointments with university, training bodies, and so on; and,
- co-principal ship.

2. Ways in which school leaders can strengthen the recruitment, development and retention of effective teachers

2.1 School systems and their leaders need to consider conferring greater professional autonomy to teachers – it has been shown to enhance the attractiveness of the profession as a career choice (teachers are attracted to and stay in the profession if they feel they belong and believe they are contributing to the success of their school and its students).

2.2 Identification and development of potential leaders need to be formalised, rather than be left to chance. The process needs to include provision of early leadership experiences for young teachers.

2.3 Educational interventions need to target not only the effective implementation of national programmes / priorities but also the need to progress through the inevitable developmental stages of any implementation. In targeting interventions recognition needs to be given to the fact that it is a journey and that actions (including evaluation of success) at one stage may be inappropriate, or even counterproductive, at another stage.

2.4 As part of their role school principals need to :

- value and support teachers (working with rather than through them);
- buffer teachers against the excesses of the mounting and sometimes contradictory external pressures; and,
- focus on sustaining school improvement by building teacher and school capacity.

3. Ways in which school leaders lift student outcomes

3.1 Broaden what counts for effective education beyond academic achievement to include student engagement, participants and self-concept and community social capital.

3.2 Leadership to be re-considered as serving and enabling others to lead themselves, celebrating difference (in gender, ethnicity, experience, attitudes, and ideas), connectedness, and a questioning of the status quo.

3.3 As organisational learning, or collective teacher efficacy, is the important intervening variable between leadership and teacher work and then improved student outcomes, early priority be given to supporting the development of OL in schools.

3.4 Greater attention be paid to the context in which school leaders operate, especially in relation to school size, SES and the home educational environments of its students.

4. Recruitment of school leaders

4.1 Review whether accountability measures are undermining teacher and school leader autonomy.

4.2 Ensure that school leadership is about leadership, not management.

4.3 Encourage more teachers to extend their work as educators beyond the classroom to the entire school. Recruitment and retention issues in teaching and middle management are a key here.

4.4 Develop comprehensive succession frameworks for the management of educational leadership (including recruitment, development and retention) – succession planning needs to be more than just-in-time job

replacement. Needed are enough good applicants who are interested in a job with which they are familiar enough (i.e., ensure there are opportunities for familiarisation with the role) to make an informed career decision. Monitor numbers seeking middle management posts and principal training and respond if numbers look unpromising.

4.5 The position of school leader needs to not only provide job satisfaction but also to be perceived by others as providing job satisfaction. More work is needed on making school leadership an attractive and 'do-able' task for all those who hold or aspire to such positions, including looking at the workload implications. Strategies include :

- providing early leadership experiences for young teachers;
- disseminating examples of good practice in managing workload and models of school structures and processes that make effective use of administrative and other staff, using appropriate task delegation;
- demystifying the principal's role, especially administrative and financial roles and responsibilities; and,
- encouraging principals to articulate and display a sense of job satisfaction.

4.6 Selection processes need to encourage and support rather than deter leadership aspirants by, for example :

- recognising multiple career paths;
- being simplified to reduce complexity, time required and stress; and,
- being based on merit and equity principles.

4.7 Further develop professional development programs for effective selection processes.

4.8 Implement recruitment and hiring programmes aimed at increasing the

number of minority students in educational leadership programmes.

4.9 Build the attractiveness of leadership roles in schools in 'challenging circumstances'.

5. Retention – Professional Development of School Leaders

5.1 Waiting until school leadership posts have been secured before training is too late – there is a need to pay greater attention in a coherent and systematic manner to a period of induction as an important and distinct learning phase in a school leaders life and work.

5.2 Leadership development for middle managers should become automatic, and part of a whole career framework for leadership development.

5.3 Ensure that developmental programmes for aspiring school leaders include :

- skill of integrating external, school and personal values / vision;
- attention to encouraging participants to develop strategies for balancing work and other aspects of their lives;
- more opportunities for team members to experience professional development as a team – one version of this would include the chair of the governing body;

5.4 Find more space in all professional development programmes for school leaders for :

- examples of leadership values in action – how to articulate, prioritise, develop strategies around, and measure all leadership activities against;
- moving beyond maintenance / management to relationships and school improvement / learning outcomes;

5.5 Develop and implement for all stages of a school leader's career :

- regional and local relocation support programmes, including for spouse / partner and family;
- programmes that help moves to distribute or devolve leadership more evenly in schools;
- programmes that build on partnership arrangements in programme design, implementation, monitoring, and evaluation;

5.6 Build on the preference by educators to learn from each other by developing and refining

- quality network learning communities,
- acting and / or shared leadership roles and
- apprenticeships and / or mentoring

5.7 Seek greater clarity / evidence of the effects on schools and the people in them of performance management and standards-based professional development before committing further resources in these areas – there is, for example, a need to recognise that improving motivation is more often about a sense of achievement, responsibility and self-fulfilment that merit or performance related money.

5.8 Consider strategies to maintain motivation and challenge for experienced principals, including their not remaining a principal until retirement – allow, for example, some principals to be appointed for fixed periods by exploring attractiveness or otherwise of contracts of employment, periodic time away from the school context to undertake research sabbaticals or purposeful secondments and / or joint appointments with university, training bodies, and so on.

5.9 More emphasis needs to be given to

- effective access to, and appropriate use of, evidence (including educational research) – both in and about professional development programmes;
- the balance between autonomy and accountability including the crucial issue of independent professional control (e.g., the concern in England that the National College for School Leadership's "future work may become over directed / influenced by the imperatives of current government policy" (Earley *et al.*, 2002, p. 13);
- how school leaders are identified and selected for training;
- matching training methods to learning outcomes;

3.8 Review of School and Instructional Effectiveness Research (Ref. – Jaap Scheerens, 2004)

Table – 6 : Effectiveness enhancing conditions of schooling in five review studies (italics in the column of the Cotton study refers to sub-categories)

Parkey& Smith, 1983	Levine &Lezotte, 1990	Scheerens, 1992	Cotton, 1995	Sammons, Hillman & Mortimore 1995
Achievement-oriented policy, cooperative atmosphere, orderly climate	Productive climate and culture	Pressure to achieve consensus, cooperative planning, orderly atmosphere	Planning and learning goals, curriculum planning and development	Shared vision and goals, a learning environment, positive reinforcement

Parkey& Smith, 1983	**Levine &Lezotte, 1990**	**Scheerens, 1992**	**Cotton, 1995**	**Sammons, Hillman & Mortimore 1995**
Clear goals on basic skills	Focus on central learning skills		Planning and learning goals *school wide emphasis on learning*	Concentration on teaching and learning
Frequent evaluation	Appropriate monitoring	Evaluative potential of the school, monitoring of pupils' progress	Assessment (district, school, classroom level)	Monitoring progress
In-service training / staff development	Practice-oriented staff development		*Professional development* collegial learning	A learning organization
Strong leadership	Outstanding leadership	Educational leadership	School management and organization, leadership and school improvement, leadership and planning	Professional leadership
	Salient parent involvement	Parent support	Parent community / involvement	Home school partnership

Parkey& Smith, 1983	**Levine &Lezotte, 1990**	**Scheerens, 1992**	**Cotton, 1995**	**Sammons, Hillman & Mortimore 1995**
Time on task, reinforcement, steaming	Effective instructional arrangements	Structured, teaching, effective learning time, opportunity to learn	Classroom management and organization, instruction	Purposeful teaching
High expectations	High expectations		Teacher student interactions	High expectations
				Pupil rights and responsibilities
			Distinct-school Interactions	
			Equity	
			Special programs	
		External stimuli to make schools effective		
		Physical and material school characteristics		
		Teacher experience		
		School context characteristics		

Table – 7 : Components of Thirteen Effectiveness-enhancing Factors

Factors	Components
Achievement, orientation, high expectations	• clear focus on the mastering of basic subjects • high expectations (school level) • high expectations (teacher level) • records on pupil's achievement
Educational leadership	• general leadership skills • school leader as information provider • orchestrator or participative decision making • school leader as coordinator • meta-controller of classroom processes • time educational / administrative leadership • counselor and quality controller of classroom teachers • initiator and facilitator of staff professionalization
Consensus and cohesion among staff	• types and frequency of meetings and consultations • contents of cooperation • satisfaction about cooperation • importance attributed to cooperation • indicators of successful cooperation
Curriculum quality / opportunity to learn	• the way curricular priorities are set • choice of methods and text books • application of methods and text books • opportunity to learn • satisfaction with the curriculum

Factors	Components
School climate	• orderly atmosphere • the importance given to an orderly climate • rules and regulations • punishment and rewarding • absenteeism and drop out • good conduct and behaviour of pupils • satisfaction with orderly school climate
	Climate in terms of effectiveness orientation and good internal relationships • priorities in an effectiveness-enhancing conditions • perceptions on effectiveness-enhancing conditions • relationships between pupils • relationships between teacher and pupils • relationship between staff • relationships : the role of the head teacher • engagement of pupils • appraisal of roles and tasks • job appraisal in terms of facilities, conditions of labour, task load and general satisfaction • facilities and building
Evaluative potential	• evaluation emphasis • monitoring pupil's progress • use of pupil monitoring systems • school process evaluation

Factors	Components
	• use of evaluation results • keeping records on pupils' performance • satisfaction with evaluation activities
Parental involvement	• emphasis on parental involvement in school policy • contacts with parents • satisfaction with parental involvement
Classroom climate	• relationships within the classroom • order • work attitude • satisfaction
Effective learning time	• importance of effective learning • time • monitoring of absenteeism • time at school • time at classroom level • classroom management • homework

Table – 8 : Summary of Characteristics Associated with More Effective Teachers

Cluster	Characteristic	Description
Professionalism	Commitment	Commitment to do everything possible for each student and enable all students to be successful.
	Confidence	Belief in ones ability to be effective and to take on challenges
	Trustworthiness	Being consistent and fair, keeping ones word
	Respect	Belief that all persons matter and deserve respect

Cluster	Characteristic	Description
Thinking / Reasoning	Analytical thinking	Ability to think logically, break things down, and recognize cause and effect
	Conceptual thinking	Ability to see patterns and connections, even when a great deal of detail is present
Expectations	Drive for improvement	Relentless energy for setting and meeting challenging targets, for students and the school
	Information Seeking	Drive to find out more and get to the heart of things; intellectual curiosity
	Initiative	Drive to act now to anticipate and preempt events
Leadership	Flexibility	Ability and willingness to adapt to the needs of a situation and change tactics
	Accountability	Drive and ability to set clear expectations and parameters and hold others accountable for performance
	Passion for Learning	Drive and ability to support students in their learning, and to help them become confident and independent learners.

Note : Adapted from Hay McBer, (2000) by Anderson, 2004.

Table – 9 : Conditions of Effective teaching According to Anderson, 1999

Teaching Characteristics (Anderson)	Teaching
Enacted Curriculum • opportunity to learn • academic work : ➢ appropriate selection ➢ regular (home) work ➢ students held accountable ➢ adequate supervision	**Structuring of Lessons (Sequence)** • orientation • clear purposes • monitoring • independent practice • corrective feedback

	Communication Teachers/Students • clear explanations • showing & telling • appropriate guiding • providing feedback
Classroom Environment and Climate	**Stimulating Evolvement**
Physical Environment • classroom arrangement • equipment • seating patterns • class size **Climate (Psychological Environment)** • mutual respect • task orientation • structure	• reinforce paying attention • develop learning strategies instruments • success standards • create "holding power" in learning • keep students actively involved. • circulate during seatwork • communicate interest

Wang and Walberg, 2001, he distinguishes 12 principles of effective teaching. These are the following :

1) **Supportive classroom climate :** Students learn best within cohesive and caring learning communities. The role of the teacher as models and socializers is emphasised.
2) **Opportunity to learn :** Students learn more when most of the available time is allocated to curriculum related activities and the classroom management system emphasises maintaining students' engagement in those activities.
3) **Curricular alignment : All** components of the curriculum are aligned to create a cohesive program for accomplishing instructional purposes and goals.

4) **Establishing learning orientations :** Teachers can prepare students for learning by providing an initial structure to clarify intended outcomes and cue desired learning strategies (e.g., providing advance organisers and cueing the kind of responses that are expected).
5) **Coherent content :** To facilitate meaningful learning and retention, content is explained clearly and developed with an emphasis on its structure and connections. "When making presentations, providing explanations, or giving demonstrations, effective teachers project enthusiasm for the content and organize and sequence it so as to maximise its clarity and "learner friendliness".
6) **Thoughtful discourse :** Questions are planned to engage students in sustained discourse structured around powerful ideas.
7) **Practice and application activities :** Students need sufficient opportunities to practice and apply what they are learning, and to receive improvement-oriented feedback.
8) **Scaffolding students' task engagement :** The teacher provides whatever assistance students' need to enable them to engage in learning activities productively. Structuring and support can be lessened as the students' expertise develops.
9) **Strategy teaching :** The teacher models and instructs students in learning and self-regulation strategies. Meta-cognitive awareness and self-regulation are sought in context like problem solving and general learning and study skills. An example of teacher modelling is, for example, when a teacher thinks out loud while modelling use of the strategy. Students are stimulated to monitor and reflect on their learning.
10) **Co-operative learning :** Students often benefit from working in pairs or small groups to construct understandings or help one another master skills.
11) **Goal-oriented assessment :** The teacher uses a variety of formal and informal assessment methods to monitor progress toward learning goals.

Comprehensive assessment also examines students' reasoning and problem-solving processes.

12) **Achievement expectations :** The teacher establishes and follows through on appropriate expectations for learning outcomes.

3.9 School Climate and its Impact on School Effectiveness

What is 'School Effectiveness' ?

By definition a school is called 'effective' when it achieves what it sets out to achieve. In other words, a school is effective when its processes result in observable (not always quantifiable) positive outcomes in its student population consistently over a period of time (Reynolds, 1985). This implies that the effectiveness of a school is dependent more on its 'processes' and gauged by its 'outcomes' than on its 'intake'. 'Intake' it is borne out by research, plays only a marginal role in school effectiveness (Ten Good Schools, 1977).

It is to be acknowledged that schools do show considerable variation, in terms of student-attendance, behaviour, curricular and co-curricular performance, social and civic values, moral character, attitude to life, inter-personal skills and so on. Studies have shown that the main source of this variation does not lie in the formidable stature of the school buildings, school resources, or other infrastructure. These, it is observed, remain as mere cosmetic features that can impress the students but not effect any decisive, and lasting influence on them.

3.10 Components of School Climate

Although there is no consistent agreement in the literature on the components of school climate or their importance, most writers emphasize caring as a core element. However, some place safety foremost, defining school climate as "an orderly environment in which the school family feels valued and able to pursue the school's mission free from concerns about disruptions and

safety".

Several aspects of a school's physical and social environment comprise its climate. One organization identified the following eight areas :

- Appearance and physical plant.
- Faculty relations.
- Student interactions.
- Leadership / decision making.

How does School Climate affect School Performance ?

Numerous studies document that students in schools with a better school climate have higher achievement and better socio-emotional health. Probably the most comprehensive work in this area is being done by the Search Institute, a nonprofit organization that encourages schools and communities to develop and empower young people.

In a review of studies on the impact of support in school, the Search Institute found that a caring school climate is associated with :

- Higher grades, engagement, attendance, expectations and aspirations, a sense of scholastic competence, fewer school suspensions, and on-time progression through grades (19 studies)
- Higher self-esteem and self-concept (5 studies).
- Less anxiety, depression and loneliness (3 studies).
- Less substance abuse (4 studies).

Another study, by John Schweitzer of Michigan State University, found that when students in Detroit schools felt a sense of community with one another and a sense of belonging to their schools, they achieved higher scores on MEAP tests.

A national study of more than 12,000 seventh to twelfth graders found that connectedness to family and school significantly protects youth from seven of eight behaviors risky to their health.

3.11 Measuring School Climate

There are numerous instruments designed to measure what various authors define as school climate. These are listed and rated in the Appendix.

3.12 Changing School Climate and School Culture :

Improving student behavior and academic performance generally requires changing school climate and school culture. Change may require moving individuals and organizations along a continuum from “at risk” to “safe” to “thriving”. This process takes time to accomplish.

While making positive changes in school climate motivates staff and students to improve, the district-level school culture must also change if school reforms are to be sustained for long-term improvement.

Both school climate and school culture require significant attention when a principal or superintendent is new or when major changes are being implemented in the school system. It is worth noting that educational reform under the No School Left Behind act is essentially a long-term effort to change school culture. Note the central mantras of educational reform :

- Teachers and the school are accountable.
- All children can and must learn.

3.12.1 Some Approaches to Change

- Promoting a safe and orderly environment
- Maintain buildings in good physical condition.
- Reward students for appropriate behaviour.
- Enforce consequences for inappropriate behaviour.
- Use contracts with students to reinforce behavioural expectations.
- Post behavioural policies on bulletin boards; periodically announce them over the public address system.
- Initiate anti-building, conflict resolution and peer mediation programs.

- Engage students, staff and parents in planning school safety activities.
- Increase number and accessibility of counselors, social workers, and mentors.
- Create anonymous up lines or suggestion boxes for reporting potentially dangerous situations or providing ideas to improve school climate.
- Provide more in-school options to "blow off steam".
- Develop strategies to ensure safety during lunch periods and between classes, provide more structured activities during lunch hour.
- Provide accommodation on time-out rooms throughout the day.
- Provide in-school suspension programs with academic supports and consistent staffing.

3.13 Measuring Effectiveness

Although there exists extensive literature about how to evaluate a teacher and what method is best, there has been very little published that relates directly to quantify teacher effectiveness. Sullivan (2001) pointed out that 99% of evaluations are the result of teacher observation. Most of these observations are then formalized into rating systems. Vogt (1984) suggested using a system with four levels of performance : (a) exceeds district expectations, (b) meets districts expectations, (c) needs improvement, and (d) is unsatisfactory. Variations of this system were still in use at the time of this writing. North Carolina's TPAI (North Carolina Department of Public Instruction, 2000) used a similar ranking system.

3.14 How to Measure Effectiveness of Teaching Learning System

School Climate :

Researches have pointed out "*a significant difference in student achievement between schools with a good school climate and those with a poor school climate"* (Bulach, Malone & Castleman, 1994). We, therefore, must

identify the factors that enable a healthy school climate, and create them in every school, because that is the very quintessence of a good school.

The three essential P's of a healthy, school climate are Place, People and Processes. When these three elements are complementary and are in consonance with each other, a congenial climate is created. Every school should aim at creating such a climate. Its positive impact on children will manifest in their better learning and responsible behaviour, which finally makes them accomplished human beings.

Classroom Management and Teacher Attitude :

The teaching strategies employed by a teacher, and his or her interpersonal skills are two major influences on student behaviour. The general sensitivity and efficiency with which this is done is likely to produce strong effects on pupils 'behaviour' (Rutter *et al.*, 1979). Pupil behavior is determined by the way the teacher goes about his / her teaching and organisation of the learning activities. Pupils' classroom behavior was much better when the teacher arrived on time to class, had prepared the lesson thoroughly and planned the teaching strategies thoughtfully. On the other hand if a teacher is disorganised, not punctual, wasted time in organising or sorting out things at the last minute, there used to be confusion resulting in the misbehavior of pupils (Bennet, 1978). In fact one of the hallmarks of successful classroom management is keeping pupils actively engaged in productive activities rather than making them wait for something to happen (Gump, 1974).

Research findings also suggest that a teacher who spends too much time dealing with the problems of individual children distracts the attention of the class, spoiling the teaching-learning atmosphere. For instance pupil behavior was much better when teachers used all available opportunities to praise good behaviour, or at least show signs of appreciation. Conversely, it was seen that the amount of formal punishment made little difference, if anything, the more

frequent the disciplinary interventions, the more disruptive the behavior of the pupils.

The desirable strategy would be to resort to 'quiet reprimands', which are more effective than loud and frequent nagging of pupils in the classroom. 'Constant nagging and reprimands may actually provoke and perpetuate disruptive behaviour' (Patterson, 1977).

School Values and Norms of Behaviour :

To be good and effective, a school should have a clear organisation, characterised by stated missions, goals, values and standards of performance. It has to strive to create a professional environment for teachers that facilitate the accomplishment of their work. Teachers participate in decisions affecting their work, have reasonable autonomy to carry out their work, share a sense of purpose and community, receive recognition, and are treated with respect and dignity and they enjoy a sense of pride and fulfilment in their profession. Such a school will have a Principal, with a driving vision who imbue decisions and practices with meaning, placing powerful emphasis on why things are done, as well as on how they have to be done. Decisions are not made just because they are practical, but for reasons of sound principle and noble purpose (Chayya, 1997).

Feedback :

Pupils' action are constantly guided and controlled by the feedback he / she receives about what is acceptable and what is not, at school. This is a very powerful influence in his / her life's formation. The feedback can materialise in a variety of forms. It may be direct and immediate in terms of praise or reprimand, less direct and delayed if they are annual prizes of certificates for excelling in academic performance, attendance or extra curricular activities. Sometimes they are scattered over the whole academic year in terms of displaying of pupils' art work, writings etc. on Notice Boards or recognising

achievements at school assemblies. Researchers have found that the most immediate direct feedback like praise or approval had the strongest association with positive pupil behaviour, whereas higher incidence of punishments resulted in negative outcomes in behaviour. As far as rewards are concerned, they have realised that formal prizes at the end of the year seem to have less positive impact on pupils. Material rewards, also proved less effective, with a 'fall-off' in motivation, probably because such rewards have the effect of 'replacing intrinsic motivation with extrinsic interest which depends on the receipt of the prizes. Praise and appreciation on the other hand increase the intrinsic motivation' (Rutter *et al.*)

Reynolds has also observed that high rates of corporal punishment were associated with more delinquency and poorer attendance. Misbehavior was more prevalent in schools with formal punishment systems. It does not follow that good outcomes are more likely where there is no punishment at all. But it does seem important that there should be a reasonable balance between reward and punishment and if anything praise, rewards and encouragement need to outweigh negative sanctions.

Shared Activities between Teachers and Pupils :

Shared activities inside and outside classroom involving both teachers and pupils help in establishing a much closer rapport and an enduring relationship. It helps in breaking down certain unnecessary barriers that distance them. Activities outside the classroom with a common goal which require people to work together and share experiences and responsibilities are an effective means to reduce inter-group conflicts. But single episodes which are few and far between may not achieve the desired effect. In fact joint activities are an essential part of schooling and can go a long way towards mutual appreciation and sharing of perceptions resulting in a better and cordial relationship. Teachers can influence pupil behavior more effectively during

such extra-curricular activities whose importance is being recognised rightly these days.

Parental Trust in School Norms and Values :

Achievements in extra-curricular activities also had an impact on the positive outcomes of school life. An effective school must win the trust and esteem of its parents, and as a natural corollary those of its pupils too.

School Climate and Learning :

The terms 'school culture' and 'school climate' describe the environment that affects the behaviour of teachers and students. School culture is the shared beliefs and attitudes that characterize the district-wide organization and establish boundaries for its constituent units. School climate characterizes the organization at the school building and classroom level. It refers to the "feel" of a school and can vary from school or school within the same district. While an individual school can develop a climate-independently of the larger organization, changes in school culture at the district level can positively or adversely affect school climate at the building level.

School Culture :

School culture reflects the share ideas – assumptions, culture, and beliefs that give an organization its identity and standard for expected behaviors. These ideas are deeply imbedded in the organization and, to a great extent, operate unconsciously. They are so ingrained that they are often taken for granted. Understandings shared by teachers, staff, and students structure their responses to demands made from outside (e.g. by parents and the community), and from inside (e.g. by the central administration and its communication of directions from the school board and state and federal governments). School culture is based on past experience which provides a template for future action based on "how we do things in this organization").

Components of School Culture :

Culture is reflected in an organization's atmosphere, myths, and moral code. The characteristics of a school district's culture can be deduced from multiple layers :

- Artefacts and symbols : the way its buildings are decorated and maintained.
- Values : the manner in which administrators, principals and staff function and interact.
- Assumptions : the beliefs that are taken for granted about human nature.

As a school district's culture develops over time, it is maintained by several practices :

- Common beliefs and values that key individuals communicate and enforce.
- Heroes and heroines whose actions and accomplishments embody these values.
- Rituals and ceremonies that reinforce these values.
- Stories that reflect what the organization stands for

The following chart shows how these components of school culture can support or impede learning. School culture that...

	Supports Learning	**Impedes Learning**
Artifacts and symbols	The building and its arrangements reflect the children, their needs, and their educational accomplishments.	There is little that reflects an emphasis on children and their education.
Values	Administrators, teachers, students and parents participate in decision making.	Decisions are made without participation of teachers and parents.

	Supports Learning	Impedes Learning
Assumptions and beliefs	All students can learn. Parents want their children to succeed. Parents are partners in education.	Some students are incapable of learning or too lazy to learn. Parents don't care. Parents know nothing about education.

School Climate :

School climate reflects the physical and psychological aspects of the school that are more acceptable to change and that provide the preconditions necessary for teaching and learning to take place.

3.15 Transformational Leadership

During the 1970s, James McGregor Burns in his book 'Leadership sought to define behaviours used by leaders to motivate or influence followers. He identified transformational leadership as a process whereby leaders and followers can raise each other to higher levels of motivation and morality. At the heart of this process is the leader's desire and ability to raise the consciousness of others by appealing to powerful moral values and ideals.

Attributes of Transformational Leadership

Providing Vision : Behaviour on the part of the leader aimed at identifying new opportunities for his or her school and developing articulating and inspiring others with his / her vision of the future.

Modelling Behaviour : Behaviour on the part of the leader that sets an example for staff members to follow, consistent with the values the leader displays.

Fostering Commitment : Behaviour on the part of the leader aimed at promoting cooperation among staff members and assisting them to work together toward achieving common goals.

Providing Individualized Support : Behaviour on the part of the leader that indicates respect for staff members and concern about their personal feelings and needs.

Providing Intellectual Stimulation : Behaviour on the part of the leader that challenges staff members to re-examine some of their assumptions about their work and rethink how it may be performed.

Establishing High Performance Expectations : Behaviour that demonstrates the leader's expectations for excellence, quality, and high performance by staff.

3.16 Instructional Leadership

Three aspects of principal behaviour serve to measure instructional leadership " promoting school wide professional development, monitoring and providing feedback on the teaching and learning process, and developing and communicating shared goals.

Principals who demonstrate good instructional leadership role are characterized by frequent observation of and / or participation in classroom instructions, clear communications to staff of expectations relative to instructional programme, central involvement in decision-making relative to the instructional programme. These principals also actively participate in planning and evaluating the instructional programme and in demonstrating high expectations for the instructional programme.

There is also considerable evidence to suggest that although principals know that instructional leadership is a key role in a school and that they are largely responsible for it, principals tend to leave this responsibility to others or neglect it altogether. An examination of principals' work time indicates that most principals spend their time on administrative behaviour.

3.16.1 Four Main Qualities of an Instructional Leader

Resource Provider :

Behaviour that demonstrates the principal's effective use of time and resources, skill as a change agent, the ability to motivate staff members, and knowledge of staff members' strengths and weakness in order to provide instructional resources that may be helpful to them.

Instructional Provider :

Behaviour that demonstrates the principal's ability to evaluate and reinforce appropriate and effective strategies, instructional provider behaviour includes supervising teachers with a focus on instructional improvement and utilizing student outcome information directly related to instructional issues.

Communicator :

Behaviour that demonstrates the principal's ability to evaluate and deal effectively with staff, and write clearly and concisely, and to facilitate groups in selecting courses of action through problem-solving techniques, communicator behaviour includes mediation in conflict situations, use of a variety of group process skills in interaction with teachers, parents and students, and use of skill as a team member.

Visible Presence :

Behaviour that demonstrates the principal's ability to work cooperatively with teachers and the community, and to be visible to the staff, students and parents.

Managerial Leadership :

Managerial leadership in this context refers to supporting implementation through resource management and includes those factors that under gird the principal's ability to implement practices that establish and maintain a caring

and supportive teaching learning environment. This type of leadership may be done through the development of positive interpersonal relationships among members of the organization and effective day-to-day operational procedures for the school. These factors include :

Teacher Relations :

The principal develops effective working relationships with teachers through appropriate communication skills, sensitivity to needs, appropriate support and reinforcement.

Student Relations :

The principal develops effective working relationships with students through appropriate communication skills, encouragement, support and high visibility.

Interactive Process :

The principal develops effective working relationships with teachers through appropriate communication skills, sensitivity to needs, appropriate support and reinforcement.

Student Relations :

The principal develops effective working relationships with students through appropriate communication skills, encouragement, support and high visibility.

Interactive Processes :

The principal organizes tasks and personnel for the effective day-to-day management of the school, including providing appropriate information to teachers and students, developing appropriate rules and procedures and setting the overall tone for discipline in the school.

Managerial Capability :

With reference to the above mentioned factors, the principal should have the managerial capability to bring about the desirable level of school performance. Managerial capability is a complex set of interlocking attributes that result in the effective application of the principal's management skills, abilities and knowledge.

Some key managerial attributes and associated definitions are listed below :

People Leadership :

A dynamic relationship based on mutual influence and common purpose between leader and subordinates(s) in which both are moved to higher levels of motivation, productivity and discipline as they effect real, intended change.

3.17 Strategic and Operational Planning

Strategic Planning is a continuous process in planning with all main stakeholders for the achievement of the ministry's policies and goals. It includes the process of establishing and clarifying goals, deciding on the main objectives, and determining the major means and strategies through which these objectives will be pursued.

Operational Planning is translating a strategic plan into plans of action. For principals and education officers operational planning may be seen as translating national education policies into teaching and learning objectives, programme activities and targets. The process reflects how the objective is achieved, by when, at what cost and the responsibility for completion of each action.

Performance Appraisal :

A structured formal interaction between supervisor and subordinate in which the work performance of the subordinate is examined and discussed with

a view to identifying weaknesses and strengths as well as opportunities for improvement and skill development.

Financial Management :

The process of managing the financial resources of the school including accounting and financial reporting.

Communication :

The process of facilitating communication (both oral and written) with significant stakeholders, keeping staff informed of goals, plans, and strategies, and 'listening' to what they have to say.

I am the Leadership Tree. I grow in the soil of *Continuous Improvement*. I was planted by some great minds to bring success especially to all teachers in charge because I love education.

My root is called *Transformational Leadership*. It is constantly moistened (led) with fertilizers that provide the nutrients to develop the *direction of the school*. The nutrients that I..... are v*ision, modelled behaviour, commitment, individual support, intellectual stimulation, high performance expectations.*

The nutrients enable me to hold / carry a strong (firm) trunk, which has an impact upon my existence to establish a *Caring, Collaborative* and *Supportive Culture* for all the stakeholders, it holds me upright.

I have two main supporting branches which are *Managerial Leadership* and *Instructional Leadership*. These branches are kept strong, enabling them to nurture the *supervision, facilitation* and *implementation* of my leaves of *procedures* and *policies* in order to *promote* the growth of my attractive flowers with petals labelled *effective classroom practices* and *efficient use of resources*; the outcome of which are my healthy fruits of *Effective School Performance* and *Student Success.*

Extracting from the related studies the following dimensions are :

1. Instructional Strategy.
2. Policy and Goals.
3. Reasoning.
4. School Environment.
5. Student-Teacher Relationship.
6. Quality of Curriculum.
7. Effective Leadership.
8. Evaluation System.

CHAPTER – IV

METHODOLOGICAL ANALYSIS

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METHODOLOGICAL ANALYSIS

4.1 Methodology – 1 : Analysis of Evaluation System

Introduction : Present Evaluation System of Physical Science at Secondary Level Schools in West Bengal

Actually the recent development in measurement of educational instrument and evaluation may be regarded as an extension and improvement of old practices. At present examinations are the usual means adopted in evaluating the achievement of the students both in formative and in summative approach where constructivist approach will be the ultimate reality.

As per the recommendation of Kothari Commission (1964), the structure of secondary education in West Bengal is reorganized in 1974 and school education of ten year's duration is introduced. At the end of class-X, West Bengal Board of Secondary Education conducts an external examination namely Madhyamik Examination to mark the termination of the first ten years of general school education. The examination is conducted on different subjects, Physical Science is one of them. In Madhyamik Examination, oral tests are also introduced along with the written tests. There are nine compulsory papers in the examination and each paper carries one hundred full marks. Ninety marks are allotted for written test and ten marks for oral test. The topics of the question papers are confined both to the syllabus of classes IX and X.

The system of examinations was always criticised. Education commissions and committees hitherto appointed by the Government of India have strongly felt the need of reforming examinations in Indian education from time to time. All the expert bodies have recommended that each Board or University should set up an examination research unit to analyse the examinations conducted under its supervision. The work of the unit should be to

design the structures of examinations, to study tabulated marks for better scaling, to assist the paper-setters, in devising appropriate question items, and to make recommendations for better administration of examinations. They also pointed out that the reforms of examinations should be based on research evidence gathered, not merely through descriptive statistics such as frequency distributions, means and standard deviations of marks, but through correlational analysis of the individual questions of the existing external examinations.

There is no doubt that several attempts had been made from time to time for reformation of the examination system. In West Bengal, according to the recommendation of Kothari Commission, the secondary education was reorganized in 1974. All the four factors of examination namely, the syllabus, the method of teaching, the question papers and the method of assessment had undergone a lot of changes for the improvement of the examination system. The present investigator was interested with the study of the third factor i.e. with the evaluation of question papers. In the present set-up of question papers of Madhyamik Examination of West Bengal Board of Secondary Education, a lot of objective type items and short answer-type questions are included instead of the essay-type questions of the traditional examination system. But inspite of all the attempts, there are various types of criticisms for the question papers in Physical Science set in the Secondary Examination. Some are of the opinion that the questions set for the examination are not satisfactory and a group comments that the questions are hard enough. Sometimes it is also uttered that it is not at all difficult for the ordinary students to score 60% marks or above. The teachers, the students and the guardians did not agree as regards the difficulty level or discriminating power of the items set in the question papers. There are other comments also. But it is not possible on the part of the investigator to discuss overall the criticisms within limited time period. For this, the present study was conducted on the question papers from some specific angles.

The purpose of this study is to investigate the difficulty level of the

questions, discriminating powers of the items, year-wise performance of the students and repetition of questions from year to year.

4.2 Sample

a) **Area :** The test was applied on students living in urban areas.

b) **Class :** The test was applied on the students of class IX who completed the syllabus of that class in Physical Science according to West Bengal Board of Secondary Education.

c) **Number of schools :** Two boys' schools, one co-educational school and one girls' school were taken for administration of the test.

d) **Number of students :** The test was administered on two hundred students. Out of them, hundred students were randomly selected for analysis and interpretation of data.

A sample design is a definite plan completed and determined before any data are collected for obtaining a representative sample from a given population.

To study a whole population in order to arrive at generalization would be impracticable, if not possible. Fortunately, the process of sampling makes it possible to draw valid inferences or generalizations on the basis of careful observation of variable within a relatively small proportion of the population.

Sampling tools save an investigator's time, money, and energy and enable him or her to probe problems that are too unwisely to be tackled by conventional methods. To obtain a sample representative of its population, four main techniques are devised : Random, stratified or quota, incidental and purposive.

4.3 Sample Size

In order to make a study comprehensive and to avoid sampling error i.e. the variation, which may be attributed to chance elements, a large sample is necessary. But due to lack of time due to school administration and the work is survey in nature, the investigator had to take 200 samples only.

4.4 Selection of the Sample

The students were selected from two boys' schools and one girls' school of Bankura district, and one co-education school from Bankura district.

4.5 Area of Content

The test items were confined to the syllabus in Physical Science of West Bengal Board of Secondary Education taught in Class – IX.

4.5.1 Selection of Question Papers

The question papers of consecutive four years (2009, 2010, 2011 and 2012) were taken into consideration.

The present researcher admitted that if the test was administered with the items confined both to the class IX and class X syllabi of Physical Science, the survey would have been conducted on a limited number of students of class X from four schools of urban areas and with question papers of consecutive four years only.

The system of examinations is open to much criticisms and yet examinations are indispensable. It is the integral part of the total system of education. So the study of evaluation and examinations is very essential for bringing about fruitful reforms in the system of education and examination.

For drawing up a consistent programme of examination reform, it is necessary as a first step to review the position through statistical analysis of all the four factors of examination and education as mentioned earlier. The present researcher was interested with the study of question papers and attempted to study the appropriateness of the question items from the viewpoint of their power of discrimination, difficulty value, repetitions questions etc. Attempts were made to study yearwise performance of the sample. The present researcher will determine the following :

i) the difficulty value of the questions set in the question papers that is "to what extent the candidates achieve correctness of response to the item",

ii) the discriminating value of the questions set in the question papers,

iii) the repetitions of questions from year to year,

iv) the performance of sample in four consecutive years, was not possible to the researcher to make a thorough investigation on question papers from every point of view, but there is no doubt that properly constructed question papers can be very serviceable as a measuring tool of achievement of the students. The present researcher hoped that his findings and observations on question papers may be of particular interest to teachers, paper setters and examiners to evaluate the system.

The subject by its very nature offers ample opportunity for continuous research involving the past, the present and the future systems of education and examination.

4.6 Statement of Hypotheses

Keeping in mind the above considerations, the researcher formulated the following hypotheses :

1) The questions were not set in order of graded difficulty.

2) The questions were set in such a way that most of them could not separate the high achievers from the low achievers.

3) Every year questions carrying 50% marks (approximate) are repeated from the question papers of the last three years.

4) The question paper does not vary in standard from year to year *i.e.*

   i) The students answering 2009 question paper do not vary significantly in answering 2010 question paper.

   ii) The students answering 2009 question papers do not vary significantly in answering 2011 question paper.

   iii) The students answering 2009 question papers do not vary significantly in answering 2012 question paper.

   iv) The students answering 2010 question papers do not vary significantly

in answering 2011 question paper.

v) The students answering 2010 question papers do not vary significantly in answering 2012 question paper.

vi) The students answering 2011 question papers do not vary significantly in answering 2012 question paper.

4.7 Assumptions for Framing those Hypotheses

1) The researcher framed the hypothesis 1 and 2 after studying the related literature and taking into consideration the opinions of the experienced persons in the field of examinations.
2) After making a thorough look into the question papers, the researcher formulated the hypothesis 3.
3) The experienced persons, the guardians and the students opined that the standard of question papers vary from year to year. But researcher's idea is different from them on the issue, so he formulated the hypothesis 4.

4.8 Definition of Related Terms

1) **Urban Area :** An urban area, according to 1971 census included all municipal towns, cantonments and any other areas being administered by local bodies such as Town Committees, Union Committees etc. and any other place which satisfied the following empirical criteria viz. (1) a population of not less than 5000 persons, (2) a density of at least 1000 persons per square mile, (3) three-fourth of the occupation of the working population should be outside of agriculture and (4) the place should have a few pronounced urban characteristics and amenities like location of educational, medical or public institutions, offices or trading centres in it.

2) **Madhyamik Examination :** This examination is conducted by the West Bengal Board of Secondary Education to mark the termination of the first ten years of general school education.

3) **Question Paper :** The tool for measuring the achievement of the students in the written test of any individual subject taught in the school.

4) **High Achievers :** The students who obtained upper 27% marks in the test are called high achievers in this test.

5) **Low Achievers :** The students who obtained lower 27% marks in the test are called low achievers in the test.

4.9 Selection of Tool

The question papers of Madhyamik Examination of West Bengal Board of Secondary Education are the tool for measuring the performance of the students in Physical Science.

The investigator selected the question papers of Madhyamik Examination in Physical Science of the last four consecutive years (2009, 2010, 2011, 2012) as it was difficult to study with more question papers within the limited time period.

4.10 Content Area Selected

The whole content area of the question papers in Physical Science of Madhyamik Examination was confined both to the syllabus of class IX and class X. But the researcher had selected only those items that corresponded to the syllabus of class IX as recommended by the West Bengal Board of Secondary Education.

The items that have been set from the syllabus of class X as recommended by West Bengal Board of Secondary Education had been excluded as the students who had completed the syllabus of class X had not been available in the schools and there were difficulties to administer the test on the students who had been allowed in the test examination at a particular time and at a particular place.

4.10.1 Separation of Items Corresponding to the Syllabus of Class – IX

The researcher made a thorough look on the syllabus of class IX in Physical Science as recommended by West Bengal Board of Secondary Education and thereafter separated the questions corresponding to the syllabus of class IX. For example, the questions that confined to syllabus of class IX were separated from the question paper of Madhyamik Examination and were printed on a paper and this paper was named as Group-A. In a similar way Group-B, Group-C and Group-D question papers were prepared from the question papers of Madhyamik Examination on 2009, 2010, 2011, 2012 respectively. It was observed that in each group there were 20–25 items carrying approximate 55 marks in total.

4.10.2 Opinions of the Experienced Persons on Selection of Items

The original and the prepared question papers were presented to some experienced teachers who were the examiners in Physical Science of Madhyamik Examination of West Bengal Board of Secondary Education. They were requested to judge whether the items of the prepared questions papers actually corresponded to the syllabus of class–IX and whether the items that were excluded from the test actually corresponded to the syllabus of class–X.

4.11 Administration of the Test

The researcher administered the test on two consecutive days in every school. As the number of schools were four, eight days were taken for administration of the whole test. Group-A and Group-B tests were administered on the first day and Group-C and Group-D tests were administered on the same group of students on second day. The tests were administered on all the students present in the classroom. Question papers and answering sheets were supplied to all the students.

Time allowed for answering the questions was three hours per day (from 11-30 a.m. to 2-30 p.m.). The students were asked to start at the same time.

They were instructed to try each item. They were asked to complete the answers within the scheduled time limit. The tests were taken in a calm and quite atmosphere. The teachers of the schools rendered co-operation for the peaceful administration of the tool.

4.12 Scoring Procedure

. The answers of questions were sub-divided into parts as far as possible to facilitate the procedure of scoring. The answer-scripts of the students were examined against scoring key. A scoring key consisting of right answers was made before hand. Marking was made on the basis of all or none principle. This meant that no partial credit was given to any answer of any student. Each correct answer was credit with full marks. The item that was either incorrectly answered or not attempted by an individual was given zero or no credit.

Then students' performance charts consisting of one hundred students for each of the four consecutive years were prepared so as to compute the analysis more easily.

4.13 Presentation and Analysis of Test Scores in Physical Science

The test was applied on two hundred students. Out of them, one hundred students were randomly selected. The scores obtained by the students are given in Tables 10, 11, 12 and 13.

Table – 10 : Frequency Distribution of Test Scores of the Students in Physical Science in 2009

Scores	f
45 – 49	7
40 – 44	5
35 – 39	4
30 – 34	6
25 – 29	7
20 – 24	16
15 – 19	24
10 – 14	21
5 – 9	10
Total (N)	**100**

Mean (M) = 21.50 Quartile Deviation (QD) = 7.14 Median (Mn) = 18.96

Skewness (Sk) = 0.67 Standard Deviation (SD) = 11.39 Kurtosis (Ku) = -0.16

Table – 11 : Frequency Distribution of Test Scores of the Students in Physical Science in 2010

Scores	f
45 – 49	10
40 – 44	3
35 – 39	3
30 – 34	1
25 – 29	11
20 – 24	21
15 – 19	15
10 – 14	22
5 – 9	14
Total (N)	**100**

Mean (M) = 21.15 Quartile Deviation (QD) = 6.93 Median (Mn) = 19.67

Skewness (Sk) = 0.37 Standard deviation (SD) = 11.90 Kurtosis (Ku) = –0.02

Table – 12 : Frequency distribution of test scores of the students in Physical Science in 2011

Scores	f
45 – 49	10
40 – 44	4
35 – 39	11
30 – 34	11
25 – 29	16
20 – 24	20
15 – 19	10
10 – 14	13
5 – 9	5
Total (N)	**100**

Mean (M) = 26.30 Quartile Deviation (QD) = 8.25 Median (Mn) = 25.63

Skewness (Sk) = 0.18 Standard deviation (SD) = 11.25 Kurtosis (Ku) = –0.78

Table – 13 : Frequency distribution of test scores of the students in Physical Science in 2012

Scores	f
45 – 49	11
40 – 44	2
35 – 39	8
30 – 34	17
25 – 29	13
20 – 24	15
15 – 19	11
10 – 14	12
5 – 9	11
Total (N)	**100**

Mean (M) = 25.30 Quartile Deviation (Q) = 8.96 Median (Mn) = 25.38

Skewness (Sk) = –0.02 Standard Deviation (SD) = 11.98 Kurtosis (Ku) = –0.85

4.14 Finding Out the Difficulty Values of the Test Items

The difficulty values of test items were considered to be very important aspect of a test. If response to a test item be classified as either correct or incorrect, the difficulty value may be defined as the ratio of the number of correct answers to the total number of students participating in the test.

4.15 Discriminating Values of Test Items

The discriminating value is how far an item discriminates the high achievers from low achievers. Out of the various methods adopted by the psychometricians, the researcher in his study used the method adopted by Johnson by taking into account the difference of upper 27% of the total group and lower 27% of the total group responding to an item.

The researcher computed the upper–lower index of each item with the help of the formula :

$$\text{ULI} = \frac{R_U - R_l}{f}$$

where ULI = Upper–lower index, R_u, R_l = Numbers giving right answers in upper and lower groups, respectively, f = Number of examinees in each group;

a) Repetitions of Questions : A thorough enquiry was made by the investigator to study repetitions of the questions in the question paper of every year.

b) Yearwise Difference in Performance : Year to year difference in performance of the subjects was studied by the researcher.

Difficulty Indices :

Each item of the question papers of 2009, 2010, 2011 and 2012 were analyzed in terms of difficulty value.

In Tables 14, 15, 16 and 17 statements of difficulty values of the items in the question papers of 2009, 2010, 2011 and 2012 are shown respectively.

Table – 14 : Difficulty Values of the Items in 2009

Item No.	Difficulty Values	Item No.	Difficulty Values
1(a)	79.78	2(b)	82.48
1(b)	66.87	2(c)	9.36
1(c)	22.24	2(d)	31.48
1(d)	58.26	2(e)	35.18
1(e)	59.26	3(a)	40.74
1(f)	48.15	3(b)	22.22
1(g)	59.26	3(c)	3.70
1(h)	61.11	3(d)	12.96
1(i)	57.41	3(e)	3.70
2(a)	72.22	4(a)	61.11
4(b)	88.89	6(a)	16.67
4(c)	29.63	7(a)	55.56
5(a)	29.63	7(b)	55.56
5(b)	16.67		

Table – 15 : Difficulty Values of the Items in 2010

Item No.	Difficulty Values	Item No.	Difficulty Values
1(a)	42.74	3(c)	21.37
1(b)	91.74	4(a)	7.41
1(c)	59.26	4(b)	22.22
1(d)	34.33	4(c)	0.00
2(a)	17.67	5(a)	33.33
2(b)	42.59	5(b)	27.78
2(c)	44.44	6(a)	77.78
2(d)	87.89	6(b)	61.11
2(e)	9.26	6(c)	31.48
3(a)	24.07	7(a)	62.96
3(b)	7.41	7(b)	7.41

Table – 16 : Difficulty Values of the Items in 2011

Item No.	Difficulty Values	Item No.	Difficulty Values
1a(i)	76.33	2(d)	0
1a(ii)	98.00	3(a)	61.11
1a(iii)	83.33	4(a)	83.33
1a(iv)	66.67	4(b)	87.04
1a(v)	62.96	4(c)	27.78
1a(vi)	61.11	5(a)	29.63
1b(i)	59.26	5(b)	40.74
1b(ii)	81.48	6(a)	50.00
1b(iii)	53.70	6(b)	70.37
1b(iv)	44.44	6(c)	40.74
1b(v)	66.67	7(a)	72.22
2(a)	50.00	7(b)	27.78
2(b)	33.33	7(c)	24.07
2(c)	5.56		

Table – 17 : Difficulty Values of the Items in 2012

Item No.	Difficulty Values	Item No.	Difficulty Values
1(a)	45.30	3(c)	0
1(b)	75.07	4(a)	3.70
1(c)	25.83	4(b)	50.00
1(d)	29.63	4(c)	20.37
1(e)	26.78	5(a)	42.59
1(f)	26.93	5(b)	7.40
1(g)	36.19	6(a)	18.52
1(h)	70.37	6(b)	92.59
1(i)	12.11	7(a)	85.19
2(a)	68.52	7(b)	25.93
2(b)	40.74	7(c)	42.59

Item No.	Difficulty Values	Item No.	Difficulty Values
2(c)	1.86	8a(i)	25.93
2(d)	85.19	8a(ii)	25.93
2(e)	29.63	8a(iii)	61.11
3(a)	77.78	8b(i)	31.48
3(b)	20.37	8b(ii)	

Table – 18 : Frequency Distribution of Difficulty Values of the Items in 2009, 2010, 2011 and 2012

Difficulty Values	f (2009)	f (2010)	f (2011)	f (2012)
1.00 – 1.04	2	1	1	1
0.95 – 0.99	0	0	0	0
0.90 – 0.94	0	1	0	1
0.85 – 0.89	1	1	1	2
0.80 – 0.84	0	0	4	0
0.75 – 0.79	1	1	0	1
0.70 – 0.74	1	0	2	3
0. 65 – 0.69	1	0	2	1
0.60 – 0.64	2	2	3	1
0.55 – 0.59	6	1	1	0
0.50 – 0.54	0	0	3	1
0.45 – 0.49	1	0	0	1
0.40 – 0.44	1	2	3	3
0.35 – 0.39	1	0	0	2
0.30 – 0.34	3	3	2	3
0.25 – 0.29	0	1	2	5
0.20 – 0.24	2	3	1	2
0.15 – 0.19	1	1	0	2

Difficulty Values	f (2009)	f (2010)	f (2011)	f (2012)
0.10 – 0.14	1	0	0	1
0.5 – 0.09	2	4	1	0
0.0 – 0.04	2	1	1	1
Total No. of Items	**N = 28**	**N = 22**	**N = 27**	**N = 32**

From the studies of the difficulty values of items of the question papers of Madhyamik Examination of West Bengal Board of Secondary Examination in the years 2009, 2010, 2011 and 2012, it was evident that the questions were not set in order of graded difficulty which leads to the retention of hypothesis H_1.

Discriminating Indices :

The discriminating values of the items in the question papers of 2009, 2010, 2011 and 2012 were also found out. It contained serial number of the items, the number of successful students in upper 27% group, number of successful students in lower 27% group and discriminating value of each item.

U. Gr. denotes upper group; i.e. upper 27% of the total sample, L. Gr. denotes lower group; i.e. lower 27% of the total sample. Total number of students involved in the test being 100.

It was evident that most of the items had not been able to discriminate the high achievers from the low achievers which lead to acceptance of hypothesis H_2.

Table – 19 : Frequency Distribution of Discrimination Values of the Items in 2009, 2010, 2011, 2012

Discrimination Values	f (2009)	f (2010)	f (2011)	f (2012)
10.00 – 10.04	1	0	0	1
0.95 – 0.99	0	0	0	0
0.90 – 0.94	0	0	0	0
0.85 – 0.89	0	0	0	1
0.80 – 0.84	1	0	2	0
0.75 – 0.79	0	1	0	0
0.70 – 0.74	0	0	0	2
0. 65 – 0.69	0	1	1	0
0.60 – 0.64	2	1	0	0
0.55 – 0.59	1	0	5	1
0.50 – 0.54	3	1	3	1
0.45 – 0.49	1	2	2	1
0.40 – 0.44	2	5	2	4
0.35 – 0.39	3	0	2	1
0.30 – 0.34	2	1	1	5
0.25 – 0.29	3	1	2	2
0.20 – 0.24	3	1	0	1
0.15 – 0.19	3	5	2	3
0.10 – 0.14	1	1	3	1
0.5 – 0.09	2	1	0	2
0.0 – 0.04	0	1	2	3
Total No. of items	**N = 28**	**N = 22**	**N = 27**	**N = 32**

Table – 20 : Comparative Study of Difficulty Values and Discriminating Values in 2009

Item No.	Difficulty Values	Discriminating Values	Item Values	Difficulty Values	Discriminating Values
1.a	77.78	0.24	3.a	41.73	0.84
1.b	58.67	0.52	3.b	22.22	0.54
1.c	22.22	0.16	3.c	3.72	0.07
1.d	59.26	0.22	3.d	12.96	0.26
1.e	59.26	0.37	3.e	3.70	0.17
1.f	48.15	0.37	4.a	61.11	0.63
1.g	58.26	0.44	4.b	88.89	0.22
1.h	61.11	0.26	4.c	29.63	0.52
1.i	57.41	0.33	5.a	29.63	0.52
2.a	72.22	0.56	5.b	16.67	0.26
2.b	81.48	0.15	6.a	16.67	0.33
2.c	9.26	0.18	6.b	5.56	0.11
2.d	31.48	0.63	7.a	55.56	0.52
2.e	37.18	0.48	7.b	55.56	0.52

Table – 21 : Comparative Study of Difficulty Values and Discriminating Values in 2010

Item No.	Difficulty Values	Discriminating Values
1.a	47.74	0.26
1.b	91.78	0.19
1.c	58.26	0.66
1.d	33.33	0.44
2.a	16.67	0.19
2.b	42.59	0.48

Item No.	Difficulty Values	Discriminating Values
2.c	44.44	0.44
2.d	88.89	0.07
2.e	9.26	0.11
3.a	24.07	0.48
3.b	7.41	0.15
3.c	20.37	0.26
4.a	7.41	0.15
4.b	22.22	0.44
4.c	0	0
5.a	33.33	0.30
5.b	27.78	0.41
6.a	77.78	0.44
6.b	61.11	0.78
6.c	31.48	0.63
7.a	62.96	0.52
7.b	7.41	0.15

Table – 22 : Comparative Study of Difficulty Values and Discriminating Values in 2011

Item No.	Difficulty Values	Discriminating Values	Item No.	Difficulty Values	Discriminating Values
1.a(i)	83.33	0.19	2.d	0	0
1.a(ii)	100.00	0	3.	61.11	0.11
1.a(iii)	83.33	0.11	4.a	83.33	0.26
1.a(iv)	66.67	0.37	4.b	87.04	0.19
1.a(v)	62.96	0.59	4.c	27.78	0.48
1.a(vi)	61.11	0.26	5.a	29.63	0.59

Item No.	Difficulty Values	Discriminating Values	Item No.	Difficulty Values	Discriminating Values
1.b(i)	59.26	0.52	5.b	40.74	0.81
1.b(ii)	81.48	0.37	6.a	50.00	0.41
1.b(iii)	53.70	0.56	6.b	70.37	0.52
1.b(iv)	44.44	0.81	6.c	40.74	0.67
1.b(v)	66.67	0.52	7.a	72.22	0.33
2.a	50.00	0.56	7.b	27.78	0.56
2.b	33.33	0.44	7.c	24.07	0.48
2.c	5.56	0.11			

4.16 Methodology – 2 : To Find out Information relating to the System

The research was based on descriptive type survey research.

a) Tools Used :

An attitude scale regarding teaching learning system was used as a device for collecting data.

b) Reliability :

Items were considered to be highly reliable and the correlation coefficient was found to be 0.78 calculated by test-retest method.

c) Validity :

Content validity was highly maintained during study.

d) Sample :

Students of class–IX of some selected schools of secondary level were used as sample. Questionnaires were applied for collecting the data and the sampling technique was purposive in nature.

Conducting t-test for observing genderwise variation 200 samples were taken and for conducting Chi-square test, 90 samples were taken.

e) Rationale for Methodology :

As most of the systems were selective in nature in case of School Effective Research and Academic Achievement, it was better to apply statistics in terms of counted data leading to non-parametric statistics. T-tests was used for taking inference for measuring attitude of students.

f) Dimensions :

1. Instructional Strategy.
2. Policy and Goals.
3. Reasoning.
4. School Environment.
5. Student-Teacher Relationship.
6. Quality of Curriculum.
7. Effective Leadership.
8. Evaluation System.

4.17 Null Hypotheses

H_{01} : There is no significant mean difference towards teaching and learning regarding Instructional Strategy between boys and girls.

H_{02} : There is no significant mean difference towards the attitude regarding school's Policy and Goals between boys and girls.

H_{03} : There is no significant mean difference towards the attitude regarding Reasoning between boys and girls.

H_{04} : There is no significant mean difference in the views regarding school environment between boys and girls.

H_{05} : There is no significant mean difference towards the attitude regarding Student Teacher relationship between boys and girls.

H_{06} : There is no significant mean difference towards the attitude regarding Quality of Curriculum between boys and girls.

H_{07} : There is no significant mean difference in the views regarding Evaluation system between boys and girls.

H_{08} : There is no significant mean difference towards the attitude regarding Effective leadership between boys and girls.

H_{09} : There is no significant mean difference towards the attitude of Instructional Strategy between urban and rural areas.

H_{010} : There is no significant mean difference towards the attitude of Policy and Goals between urban and rural areas.

H_{011} : There is no significant mean difference towards the attitude of Reasoning between urban and rural areas.

H_{012} : There is no significant mean difference towards the attitude of School Environment between urban and rural areas.

H_{013} : There is no significant mean difference in the views regarding Student-Teacher relationship between urban and rural areas.

H_{014} : There is no significant mean difference in the views regarding Quality of Curriculum between urban and rural areas.

H_{015} : There is no significant mean difference of Effective leadership between urban and rural areas.

H_{016} : There is no significant mean difference in the views regarding Evaluation system between urban and rural areas.

4.18 Statistical Calculation

To interpret the data collected in the research work, the researcher used the mean, median, standard deviation, skewness, kurtosis and the ‘t’ test for testing whether there was significant difference between the groups.

4.18.1 Choice of Statistical Test

The conditions were (1) independence of the observations, (2) normality of population distributions and (3) homogeneity of the groups required for ‘t’ test

were to be satisfied. Since the sizes of the groups to be compared were equal, the conditions (2) and (3) however need not be satisfied. Thus under the assumption of independence of observation the 't' test was applied for analysis of data.

't' Test :

The 't' test helps us to determine whether two groups differ significantly in mean performance and enables us to say with confidence that there is a difference between the means of the population from which the samples were drawn. The equation of the 't' test is stated as follows :

$$t = \frac{M_1 - M_2}{\sqrt{\frac{a_1^2}{N_1} + \frac{a_2^2}{N_2}}}$$

where M_1 and M_2 represent two sample means of group A and group B and a_1 and a_2 are the standard deviation of the two samples respectively.

Where a difference is to be taken significant or not depends upon the probability that the given differences could have arisen "by chance".

Experimenters have for convenience chosen arbitrary standards, called levels of significance of which 0.05 and 0.01 levels are mostly used.

4.19 Hypotheses Testing

Hypothesis	Mean	SD	Mean	SD	MD	n	t	Sig. level
1	78.45	7.53	65.15	6.11	13.30	100	13.72	**
2	77.45	7.63	72.10	8.57	5.35	100	4.66	**
3	71.80	7.63	66.45	7.84	5.35	100	4.89	**
4	68.71	7.11	58.10	8.57	10.61	100	9.53	**
5	67.65	8.71	58.80	8.84	8.85	100	7.13	**
6	65.10	9.57	60.80	8.84	4.30	100	3.30	**
7	62.10	8.57	58.76	7.84	3.34	100	2.88	**

Hypothesis	Mean	SD	Mean	SD	MD	n	t	Sig. level
8	77.10	8.57	68.80	8.84	8.30	100	6.74	**
9	77.45	7.63	72.10	8.57	5.35	100	4.66	**
10	72.80	7.63	56.45	7.84	16.35	100	14.95	**
11	68.71	7.11	58.10	8.57	10.61	100	9.53	**
12	66.65	7.71	58.80	8.84	7.85	100	6.69	**
13	68.10	9.57	64.80	8.84	3.30	100	2.53	*
14	66.10	8.57	58.76	7.84	7.34	100	6.32	**
15	72.10	8.57	68.80	8.84	8.84	100	7.18	**
16	76.10	8.57	68.80	8.84	7.30	100	5.93	**

n = Total observations in each group, SD = Standard Deviation,

MD = Mean Difference,

t at 0.05 level = 1.97, t at 0.01 level = 2.60, df = 198

* Sig. at 0.05 level, ** Sig. at 0.01 level.

4.20 Methodology – 3 : To Determine Mechanism of the Effective Teaching Learning System

A teaching model in an experimental condition was applied to determine the mechanism of the effective teaching learning system

4.21 Strategic Points of the Experimental Model

Following this model, the learning process proceeded through some criteria and strategies as follows :

Size of the Class :

- Number of students of control group = 62
- Number of students of experimental group = 62

Basic academic standard of each class = 60% and above score in Physical Science group at entry level.

Classes taken / group / week = 2

Class Climate :

1. Traditional class environment maintained.
2. Whole class was divided into two groups with 6 rows in each group.
3. Each row provided 5 students.
4. Teachings aids (General requisites charts) were used.

Announcement of the Topic and Sub-topic to be taught :

Topic and sub-topic is to be announced and then to be written on blackboard.

1st half of the class : Teacher-student Interaction

Duration = 30 minutes. a) Preparatory stage – 10 minutes.
b) Interactive stage – 20 minutes

Steps of Teacher-Student Interaction :

Step-1 : Teacher will start in announcing the topic and sub-topic to be taught.

Step-2 : Teacher will first clarify the topic.

Step-3 : Now teacher will proceed with the topic.

Step-4 : First teacher will ask the students – What is the meaning of topic ?

Step-5 : Then teacher supports the answer of the students or correct the answer and clarify the meaning.

Step-6 : Then teacher enters into the sub-topic and ask the students to discuss the meaning of sub-topic.

Step-7 : Students answer the meaning of sub-topic.

Step-8 : Teacher expresses his satisfaction.

Step-9 : Through the teacher-student interaction whole content area of the sub-topic is covered.

Step-10 : Teacher asks students to discuss their difficulty areas with teacher.

Step-11 : Teacher categorically satisfies each and every students by experienced teaching.

2nd Half of the Class : Student-student Interaction

Duration = 15 minutes

Steps of Student-Student Interaction :

Defining the pre-requisite knowledge and skill in behavioral terms of entry level behavior.

The description of entering behaviour lacks two characteristics of terminal behaviour. They do not describe the conditions under which the performance must occur, and they do not specify a standard of acceptability. Although a statement of entering behaviour would include all the characteristics of a terminal behaviour, the list of entering behaviour on the units (preparation & study of the simple properties of gases like 'Hydrogen, oxygen & Carbon-di-oxide and Magnets) selected for test.

For each terminal behaviour, attempt has been made to identify the corresponding entry-level behaviour.

The entering behaviour on the units (i) preparation & study of the simple properties of gases like H_2, O_2, CO_2 and (ii) Magnets is given below :

1. The learner defines composition of air.
2. He explains 'Air' as a mixture of several gases.
3. He states the name of the constituent gases and their percentages in respect of volume in the air.
4. He explains that the air has weight.
5. He detects oxygen as important element in breathing.
6. He indicates the statement – "The Hydrogen gas is lighter than the air'.
7. He explains carbon-di-oxide as an important constituent in photosynthesis to prepare simple carbohydrate food by the green plants.
8. Given an example explaining a gas balloon filled with Hydrogen gas in close contact with fire, he indicates the possible danger of taking a flight with a balloon filled with Hydrogen gas.

9. He states the percentile ratio of volume and weight of Hydrogen-gas in the compound water.
10. He identifies the simple nature of Hydrogen, Oxygen and Carbon-di-oxide as daily concern.
11. He defines an atom.
12. He states the participation of an atom in chemical reactions.
13. He states the name of the lightest atom.
14. He identifies different types of matter and also explains their nature.
15. He explains elementary ideas of elements.
16. He defines 'Compound' : He compares mixture with compounds.
17. He states the characteristics of a mixture.
18. Given an example explaining the change of state of the into water and (water) vapour respectively, he defines the physical properties of a matter.
19. He compares physical property with chemical property.
20. Given two examples defining two different types of changes : one temporary and other permanent, he indicates the difference between physical and chemical change.
21. Given some examples explaining different changes, he identifies 'which one is physical change' and 'which one is chemical change'.
22. He states the process of distillation to separate the constituents of a solution composed of sugar and water.
23. Given some examples regarding the procedure of separation of a mixture by magnets, he explains the use of magnet.
24. Given an explanation showing two poles – 'N' and 'S' a magnet, he defines simply the term 'Magnet'.

Development of Measuring Instruments :

Development of Achievement Test :

In the present experiment, entry level achievement can be measured by the scores obtained in the (Entry Level) achievement test. So the researcher constructed the achievement test by going through the following stages.

a) Planning of the Achievement Test :

To lay out a plan for constructing the achievement test, firstly, the content area was carefully judged and entry level objectives were identified. Secondly, the behavioural outcomes in terms of knowledge, comprehension, skill and application were worked out. Finally, types of items were selected. Here, the researcher to avoid any biasness in the test, preferred mainly the objective and short answer type items. Hence he framed a test blue print for the preparation of the test items.

b) Preparation of the Test Blue-Print :

In order to build the content validity in the achievement test, it was necessary that the test items in the test should represent an adequate sampling of the behaviour domain.

To accomplish this, the researcher discussed with the subject experts. The entire procedure of assigning relative weightage upon the entry-level objectives-knowledge, understanding application and skill as well as subject matter domain were selected .

Table – 23 :The Relative Weightage assigned to both Subject Matter and Objective Domains

Content	Assigned Weightage in %	Objective	Assigned Weightage in %
1.1	27.5%	Knowledge	36%
1.2	17%		
1.3	9.5%		
2.1	6%	Understanding	37%
2.2	8.5%		
2.3	7%		
3.1	7.5%	Application	17%
3.2	3.5%		
4.1	13.5%	Skill	10%
Total	**100%**	**Total**	**100%**

It was found necessary to develop the test, by including test items from each sub-unit, in such a way that correct preparation of items from a given sub-unit, may match the weightage given to a particular objective. In test literature, the procedure outlined is known as "developing a test blue print". It is the most systematic way of setting up the specification in terms of a two-way table, with objectives across the top and sub-units in the left-hand column. A blue print has been developed for the preparation of the entry-level achievement test.

c) Preparation of the Items (Entry level Test) :

The researcher has prepared items, for the written test, the items are of various types – multiple choice, true-false, analogy, matching and short answer types.

d) Scoring Principle of Achievement Test (Entry Level) :

The papers answered by the pupils have been scored. Some questions are credited with full marks (ranging from 1 to maximum 4.5 for each correct answer, and if wrong, zero. Some questions are also credited with partial scores (ranging 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5) depending upon the quality of the answer. For this purpose, the researcher has prepared a model answer to each of such questions to determine the number of points (scores) to be assigned to it and to the parts within it, validated by some experts of the subject, Physical Science.

e) Item-Analysis :

As the test is of criterion-reference type, therefore, no item analysis was attempted. Item analysis would remove some items from the test, and thus, certain behaviour domain would be lost.

f) Reliability of the Test :

Among the four methods of computing reliability such as Test-retest method, Kuder-Richardson Technique, Method of using parallel forms, Split-half method, Test-retest method was selected for determining the reliability of the test.

g) Test-retest Method :

The same test was re-administered on thirty percent of students (34 students) of the original sample, i.e., thirty four students were selected randomly from the original sample.

To reduce memory effect re-test was done after three weeks from the day of first administration.

Reliability co-efficient of the test was found to be 0.86.

Table 24 : Blue Print of Entry Level Test

Unit	Sub-unit	Knowledge		Understanding		Application	Skill	Total
		O. T.	S. A.	O. T.	S. A.			
1	1.1	7(7)	2(5)	3(3)	2(8)	–	1(4½)	15(27½)
	1.2	5(5)	1(2½)	2(2)	–	3(7½)	–	11 (17)
	1.3	1(1)	–	2(2)	1(2)	–	1(4 ½)	5 (9½)
2	2.1	–	1(2)	1(1)	1(3)	–	–	3(6)
	2.2	–	–	4(4)	1 (2½)	1 (2)	–	6(8½)
	2.3	2 (2)	1 (2)	–	1 (3)	–	–	4 (7)
3	3.1	2 (2)	1 (2½)	–	1 (3)	–	–	4 (7 ½)
	3.2	1 (1)	–	–	1 (2½)	–	–	2 (3 ½)
4	4.1	3(3)	1(2)	–	1(2½)	2(6)	–	7(13 ½)
Total		**21 (21)**	**7 (16)**	**12 (12)**	**9 (26½)**	**6 (15½)**	**2 (9)**	**57 (100)**

* Digits outside the brackets indicate no. of items

** Digits inside the brackets indicate score of the items.

h) Validity of the Test :

Validity is the most important characteristic of a test. The validity of a test means the efficiency with which it measures what it attempts to measure. The researcher determined the validity of the test scores by the following method.

i) Establishing the Content Validity :

To test the validity of the test, judgments were accepted from the experts. Firstly, they judged the weightage of the sub-units and objectives of the content (Table 4.1) on the basis of that weightage, finally the content validity was established logically by building the test blue-print which shows that the test was developed by including items which were adequate representative of the behaviour domain sampled as given in the list of entry level objectives.

4.22 Development of Related Instruments (For Final Test)

To collect relevant and adequate data and to test the hypotheses mentioned earlier, the following devices were developed.

(a) Development of Instructional Instrument,

(b) Development of Measuring Instrument

4.23 Selection of the Content Area

Two topics : (i) Preparation and study of simple properties of gases like oxygen, Hydrogen, Carbon-di-oxide and (ii) Magnets, as it occurred in the syllabus for class IX prescribed by the West Bengal Board of Secondary Education have been selected as the content for the experiment.

The rationale behind choosing these topics was the following:

i) One of the most remarkable aims of teaching Physical Science is to create interest about the physical environment around us.

ii) Since Interest Diversification Model favours the teaching of these topics, which satisfy the curiosity of these topics and since the topics mentioned above fulfil this requirement, these have been included in this experiment.

iii) Pupils in school are very much familiar with magnets, and are fully aware of elements like oxygen, hydrogen and carbon. Educators feel that they should develop interest for knowing these correctly, develop an attitude of applying these phenomena in daily life and therefore, they should indicate a spirit of intrinsic motivation. It was felt that spirit of interest can best be cultivated by teaching them through Interest Diversification Model, because in teaching through this model there is scope for arousing their curiosity and stimulating their thinking as well.

For the present experiment, the researcher divided the content area into two units. Each unit was divided into several sub-units as following :

Unit – 1

(Preparation and study of simple properties of gases like Oxygen, Hydrogen & Carbon-dioxide)

The sub-units are :

1.1 Oxygen gas	a) Preparation of Oxygen
	b) Properties of Oxygen
1.2 Hydrogen gas	a) Preparation of Hydrogen
	b) Properties of Hydrogen.
1.3 Carbon di-oxide gas	a) Preparation of Carbon-di-oxide
	b) Properties of Carbon-di-oxide

Unit – 2

(Magnets)

The sub-units are :

2.1 General idea of magnet and its different types.

2.2 Several definitions regarding magnet.

2.3 General properties.

2.4 Preparation of artificial magnet.

2.5 Magnetic induction.

The terminal objectives in behavioural terms were developed by the researcher on the same units

(i) preparation and study of simple properties of gases like Oxygen, Hydrogen & Carbon di-oxide and (ii) Magnets

The terminal objectives are given below :

1. The learner states the name of the chemical reagents related to gas preparation.
2. He explains the process to collect the Hydrogen gas in the gas-jar.
3. He explains the nature of the collection of oxygen gas in the gas-jar.

4. He states the name of the chemical reagents for oxygen-gas preparation in the laboratory.
5. He signifies the use of Manganese-di-oxide (MnO_2) as a catalyst.
6. He states the name of the chemical reagents for the Carbon-di-oxide gas preparation in the laboratory.
7. He explains the nature of the gas and identifies the process to collect the gas in the gas-jar.
8. He gives chemical equation of the Carbon-di-oxide gas preparation process.
9. He explains why diluted sulphuric acid is not used in the Carbon-di-oxide gas preparation in the laboratory.
10. He explains why concentrated sulphuric acid is not used in the laboratory preparation of Hydrogen gas from metals.
11. He identifies the Hydrogen gas and also explains how to identify.
12. Given some examples explaining the chemical properties of Hydrogen gas, he states chemical equation of each process.
13. He states the name of the absorber of Hydrogen gas and also explains the term ‘Antardhriti’.
14. He compares general Hydrogen with nascent Hydrogen.
15. Given some examples explaining their characteristics in respect of oxygen, he classifies different types of oxides.
16. He identifies the preparation of different acids from oxides stating O_2 as ‘Acid-producer gas’.
17. He states the name of the oxygen gas absorber.
18. Given some gas-jars full of different gases, he identifies the oxygen gas and also explains how to identify.
19. He explains oxidation and reduction.
20. He states the intrinsic nature of Carbon-di-oxide gas against fire and also separates it from Nitrogen gas with proper explanation.
21. He identifies different chemical properties of Carbon-di-oxide as well as

physical properties.

22. He defines the term 'Dry Ice'.
23. He states the name of the Carbon-di-oxide absorber.
24. He signifies Carbon-di-oxide as an essential element in photosynthesis.
25. He draws the figure of oxygen gas preparation in the laboratory.
26. He identifies the Carbon-di-Oxide gas and also explains how to identify.
27. Given the figures showing different magnets, he explains 'Natural and Artificial Magnets'.
28. He compares magnetic particles with non-magnetic particles.
29. He states different terms and definitions of magnet.
30. He explains the properties of magnet.
31. Given an example explaining iron particles attracted by the magnetic pole, he states the property of attraction towards magnetic particles.
32. He explains how to magnetise a body.
33. Given an example showing a piece of iron in close contact with a powerful Magnet contained a number of alpins, he explains magnetic induction.

a) Development of Instructional Instrument :

Two forms of Instructional instruments have been developed for the present study:

a) Lesson plans on Interest Diversification Model of Teaching.

b) Lesson plans on Traditional Method of Teaching.

b) Validation of the Lesson Plans :

After the completion of the draft, the researcher made a thorough editing and review of the draft, for several times on the basis of the comments of three experts on the subject and educational technology.

To establish the construct validity of the lesson plan, the researcher prepared lesson plan according to the strategy of Interest Diversification Model,

as it integrated the processes of the chief learning outcomes of Interest Diversification Model into a single, meaningful form of lesson plan splendidly. Syntax, social system and support system had been carefully inbuilt into the lesson plan as was evident from a careful scrutiny particularly of the social system in each of the lesson plan.

c) Development of Lesson Plans based on Traditional Method :

After a few modifications in this method following steps are being actually practiced now-a-days.

(i) Objectives :

After giving the lesson what will be the behavioural changes of the learners are mentioned for the stage.

(ii) Preparation :

Some questions of the type known to unknown, concrete to abstruct, and simple to complex are thrown to evaluate his previous knowledge and thereby create his interest for the days lesson.

(iii) Presentation :

In this step teacher splits up the content into small parts and delivers his lesson through explanation, demonstration and questioning.

(iv) Evaluation :

Through question-answer techniques teacher evaluates the learner's attainment regarding the days lesson and also his capacity for applying this knowledge in a new situation.

4.24 Development of Achievement Test

a) Development of Measuring Instruments :

In order to evaluate the understanding of the subject matter through the

two different treatments – Interest Diversification Model and Traditional Teaching, achievement test was found necessary.

So, the researcher constructed the achievement test by going through the following stages.

b) Planning of the Achievement Test :

To lay out a plan for constructing the achievement test, firstly, the content area was carefully judged and all the concepts and terminal objectives were identified. Secondly, the behavioural outcomes in terms of knowledge, comprehension, skill and application were worked out. Finally, types of items were selected. In order to maintain objectivity, mainly the objective type of test items and a few short answer type items were included in the test.

c) Preparation of the Test Blue-print :

In order to build the content validity in the achievement test, it was necessary that the test items in the test should represent an adequate sampling of the behaviour domain determined as a token of pupil's success (terminal objectives).

The researcher determined the weightage to be given to an objective or to an item in course of developing the test blue-print. It was found necessary to develop the test, by including test items from each sub-unit, in such a way that correct proportion of items from a given sub-unit might match the weightage given to a particular objective.

In test literature, the procedure outlined is known as 'Developing a Test Blue-print'. It is the most systematic way of setting up the specification in terms of two-day table, with objectives across the top and sub-units in the left hand column.

d) Preparation of the Items :

The researcher prepared items for the written test. The items were of

various types-multiple choice, true-false, completion analogy and recall, matching and short answer types.

e) Scoring Principle of Achievement Test :

The papers answered by the pupils were scored. Some questions are credited with full marks (ranging from 1 to maximum) for each correct answer, and if wrong, zero. For this purpose, the researcher prepared a model answer to each of such question to determine the number of points (scores) to be assigned to it and to the parts within it, validated by some experts of Physical Science subject.

Table 25 : The Relative Weightage assigned to both Subject Matter and Objective Domains

Content	Assigned weightage in %	Objectives	Assigned weightage in %
Sub-unit 1.1a	21%	Knowledge	36%
Sub-unit 1.2a	21%		
Sub-unit 1.3a	16%		
Sub-unit 2.1	9%	Understanding	34%
Sub-unit 2.2	3%		
Sub-unit 2.3	7%		
Sub-unit 2.4	6%	Application	20%
Sub-unit 2.5	6%		
Sub-unit 2.6a	5%	Skill	10%
Sub-unit 2.6b	2%		
Sub-unit 2.7	4%		
Total	**100%**	**Total**	**100%**

Table 26 : Blue Print of Final Test

Unit	Sub-unit	Knowledge		Understanding		Application		Skill	Total
		O. T.	S. A.	O. T.	S. A.				
1	1.1a	3(3)	1(2)	1(3)					5(8)
	1.1b	4(4)	—	3(3)	1(2)	2(3½)	—	—	10(12½)
	1.2a	2(2)	1(2)		1(2)				4(6)
	1.2b	4(4)		1(2)		2(2)	2(4)	2(3)	11(15)
	1.3a	2(2)			—	1(2)	—	—	3(4)
	1.3b	2(2)		1(2)		4(4)	—	4(6½)	11(14½)
2	2.1	1(1)	—	—	2(4)	1(2)	—	2(2)	6(9)
	2.2	1(1)		1(2)		—	—	—	2(3)
	2.3	1(1)		1(2)		2(2)	1(2)	—	5(7)
	2.4	—		2(4)		—	1(2)	—	3(6)
	2.5	1(1)		—		1(1)	2(4)	—	4(6)
	2.6a	1(1)		—		1(1)	2(4)	—	4(6)
	2.6b						1(1)	1(2)	2(3)
	2.7	—		—					
Total		**22(22)**	**2(4)**	**10(18)**	**4(8)**	**14(17½)**	9(17)	**9(13½)**	**70(100)**

*Digits outside the brackets indicate number of items.

**Digits inside the brackets indicate scores of the items.

e) Item Analysis :

In criterion-referenced testing, the teacher is primarily concerned with how many items of a set of specific objectives a particular student has mastered. Criterion-referenced testing does not aim for a wide range of scores because the purpose is to have all students master the objectives. Gronland (1973) states, if none of the students (or only a few) can answer an item before instruction but all of them can answer it after instruction, both the test items and the instruction have been effective.

Criterion-referenced testing is a part of individualised programs like

project PLAN and other mastery learning programs when the instructional intent is to raise almost all students to a specified level of achievement. Presently, class-room instruction through IDM uses this testing to greatest advantage when the learning outcomes are cumulative and progressively more complex.

As the test is of criterion-reference type, therefore, no item analysis was attempted. Item analysis would remove some items from the test, and thus, certain behaviour domain would be lost.

f) Reliability of the Test :

Among the four methods of computing reliability (such as test-retest method, Kuder-Richardson Technique, method of using parallel forms, split half method), Test-retest method was selected for determining the reliability of the test.

g) Test-retest Method :

The same test was re-administered on thirty percent of students of the original sample i.e. thirty-four students were selected randomly from the original sample.

To reduce memory effect re-test was done after three weeks from the day of first administration.

Reliability co-efficient of the test was found to be 0.89.

h) Validity of the Test :

Validity is the most important characteristic of a test. The validity of a test means the efficiency with which it measures what it attempts to measure.

The researcher determined the validity of the test scores by the following method.

i) Establishing the Content Validity :

To test the validity of the test, judgments were accepted from the experts. Firstly, they judged the weightage of the sub-units and objectives of the content. on the basis of that weightage. Finally, the content validity of test was established logically by building the test blue-print which showed that the test was developed by including items which were adequate representative of the behavioural domain sample as given in the list of terminal objectives.

4.25 Analysis of Covariance of Pre-test and Post-test of Experimental and Control Groups

Pretest (X)

Groups	Count	Sum	Average
Experimental	62	3426	55.26
Control	62	3052	49.23
	124	6478	

ANOVA

Source of Variation	SS	df	MS	F	P-value	F at 0.05	F at 0.01
Between Groups	1128.03	1	1128.03	2.59	0.11	3.92	6.85
Within Groups	53107.21	122	435.30				
Total	54235.24	123					

Not Significant

Post Test (Y)

Groups	Count	Sum	Average
Experimental	62	2793.53	45.06
Control	62	2325.99	37.52
		5119.52	

ANOVA

Source of Variation	SS	df	MS	F	P-value	F at 0.05	F at 0.01
Between Groups	1762.85	1	1762.85	10.15	0.00	3.92	6.85
Within Groups	21189.75	122	173.69				
Total	22952.60	123					

Significant at 0.01 level

Correction Term C_{xy} = 267453.63

Analysis of Covariance

Source of Variation	df	$SS_{x.y}$	$SS_{y \cdot x}$	$Ms_{y.x}(V_{y.x})$	$F_{y \cdot x}$	F at 0.05	F at 0.01	$SD_{y \cdot x}$
Among Group Means	1	1410.16	797.92	797.92	7.61	3.92	6.85	
Within Group SS	121	21252.29	12685.07	104.84				10.24
Total	122	22662.45	13483.00					

Significant at 0.01 level

Regression (b_{within}) 0.40

Calculation of Adjusted Y Means

Groups	N	M_x	M_y	$M_{y.x}$(adj.)
Experimental	62	55.26	45.06	43.85
Control	62	49.23	37.52	38.72
General Means		52.24	41.29	41.29

Significant of differences among adjusted Y means

SE_D	1.84
df	121
$t_{.05}$	1.98
$t_{.01}$	2.62

			Adj. Mean Diff.	t	Sig.
Experimental	vs.	Control	5.13	2.79	**

4.26 Calculation and Interpretation

Table 27 : In effective school, teachers engage students by good teaching

	SA	A	UN
Observed (f_o)	62	20	08
Expected (f_e)	30	30	30
($f_0 - f_e$)	32	-10	-22
$(f_0 - f_e)^2$	1024	100	484
$(f_0 - f_e)^2/f_e$	34.13	3.33	16.13

Table Value = 5.99 $\chi^2 = 53.59$ df = 2

Interpretation : Table 27 shows that the value of χ^2 is found to be 53.59 which is greater than the table value. Hence, the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 28 : Class size and student population are small to make a school effective

	SA	A	UN
Observed (f_o)	50	25	15
Expected (f_e)	30	30	30
($f_0 - f_e$)	20	-5	-15
$(f_0 - f_e)^2$	400	25	225
$(f_0 - f_e)^2/f_e$	13.33	0.83	7.50

Table Value = 5.99 $\chi^2 = 21.66$ df = 2

Interpretation : Table 28 shows that the value of χ^2 (calculated) is 21.66 which is greater than the table value. Hence, the result is significant at 0.05 level, Therefore, the statement is accepted.

Table 29 : High expectations and clear consequences are articulated to students frequently for effective Teaching and Learning

	SA	A	UN
Observed (f_o)	29	37	24
Expected (f_e)	30	30	30
($f_0 - f_e$)	-1	7	-6
$(f_0 - f_e)^2$	1	49	36
$(f_0 - f_e)^2/f_e$	0.03	1.63	1.20

Table Value = 5.99 $\chi^2 = 2.86$ df = 2

Interpretation : Table 29 shows that the value of χ^2 (calculated) is 2.86 which is less than the table value. Hence, the result is not significant at 0.05 level, Therefore, the statement is rejected.

Table 30 : Structured classroom routines provide stability and direction for effective school

	SA	A	UN
Observed (f_o)	44	34	12
Expected (f_e)	30	30	30
($f_0 - f_e$)	14	4	-18
$(f_0 - f_e)^2$	196	16	324
$(f_0 - f_e)^2/f_e$	6.53	0.53	10.80

Table Value = 5.99 $\chi^2 = 17.86$ df = 2

Interpretation : Table 30 shows that the value of χ^2 is found to be 17.86 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 31 : Effective schools consider time spent on academic and non-academic learning

	SA	A	UN
Observed (f_o)	53	25	12
Expected (f_e)	30	30	30
($f_0 - f_e$)	23	-5	-18
$(f_0 - f_e)^2$	529	25	324
$(f_0 - f_e)^2/f_e$	17.63	0.83	10.80

Table Value = 5.99 $\chi^2 = 29.26$ df =2

Interpretation : Table 31 shows that the value of χ^2 was 29.26 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 32 : Balance of workload i.e. time focused on T/L & time spent on administrative tasks is maintained in effective school-3

	SA	A	UN
Observed (f_o)	60	20	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	30	-10	-20
$(f_0 - f_e)^2$	900	100	400
$(f_0 - f_e)^2/f_e$	30.00	3.33	13.33

Table Value = 5.99 $\chi^2 = 46.66$ df = 2

Interpretation : Table 32 shows that the value of χ^2 (calculated) is 46.66 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 33 : Policy & Goals for planning & implementing pedagogical change for knowledge is required

	SA	A	UN
Observed (f_o)	65	15	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	35	-15	-20
$(f_0 - f_e)^2$	1225	225	400
$(f_0 - f_e)^2/f_e$	40.83	7.50	13.33

Table Value = 5.99 $\chi^2 = 61.66$ df =2

Interpretation : Table 33 shows that the value of χ^2 (calculated) is 61.66 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 34 : Assessment & Reporting practices are integral to the T/L process

	SA	A	UN
Observed (f_o)	50	20	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	20	-10	-10
$(f_0 - f_e)^2$	400	100	100
$(f_0 - f_e)^2/f_e$	13.33	3.33	3.33

Table Value = 5.99 $\chi^2 = 19.99$ df =2

Interpretation : Table 34 shows that the value of χ^2 is found to be 19.99 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 35 : Effective school frames good curriculum planning which support councils, leaders & teachers to work cohesively through their policy and goals

	SA	**A**	**UN**
Observed (f_o)	48	35	07
Expected (f_e)	30	30	30
($f_0 - f_e$)	18	5	-23
$(f_0 - f_e)^2$	324	25	529
$(f_0 - f_e)^2/f_e$	10.80	0.83	17.63

Table Value = 5.99 $\chi^2 = 29.26$ df = 2

Interpretation : Table 35 shows that the value of χ^2 (calculated) is 29.26 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 36 : Effective teaching is enhanced by challenging class-room climate

	SA	**A**	**UN**
Observed (f_o)	46	33	11
Expected (f_e)	30	30	30
($f_0 - f_e$)	16	3	-19
$(f_0 - f_e)^2$	256	9	361
$(f_0 - f_e)^2/f_e$	8.53	0.30	12.03

Table Value = 5.99 $\chi^2 = 20.86$ df = 2

Interpretation : Table 36 shows that the value of χ^2 (calculated) is 20.86 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted

Table 37 : Effective teaching depends on positive classroom environment that does not allow sleeping, talking, doing other work, phone calls etc.

	SA	**A**	**UN**
Observed (f_o)	49	38	03
Expected (f_e)	30	30	30
($f_0 - f_e$)	19	8	-27
$(f_0 - f_e)^2$	361	64	729
$(f_0 - f_e)^2/f_e$	12.03	2.13	24.30

Table Value = 5.99 $\chi^2 = 38.46$ df = 2

Interpretation : Table 37 shows that the value of χ^2 (calculated) is 38.46 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 38 : Effective teaching is "praising students' success" as it association

	SA	**A**	**UN**
Observed (f_o)	54	31	05
Expected (f_e)	30	30	30
($f_0 - f_e$)	24	1	-25
$(f_0 - f_e)^2$	576	1	625
$(f_0 - f_e)^2/f_e$	19.20	0.03	20.83

Table Value = 5.99 $\chi^2 = 40.06$ df = 2

Interpretation : Table 38 shows that the value of χ^2 (calculated) is 40.06 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 39 : Effective teaching depends on students' ratings, peer review, self evaluation, teaching portfolios and student achievement

	SA	**A**	**UN**
Observed (f_o)	40	16	34
Expected (f_e)	30	30	30
($f_0 - f_e$)	10	-14	4
$(f_0 - f_e)^2$	100	196	16
$(f_0 - f_e)^2/f_e$	3.33	6.53	0.53

Table Value = 5.99 $\chi^2 = 10.39$ df = 2

Interpretation : Table 39 shows that the value of χ^2 (calculated) is 10.39 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 40 : Teaching depends on Equity Pedagogy

	SA	**A**	**UN**
Observed (f_o)	52	33	05
Expected (f_e)	30	30	30
($f_0 - f_e$)	22	3	-25
$(f_0 - f_e)^2$	484	9	625
$(f_0 - f_e)^2/f_e$	16.13	0.30	20.83

Table Value = 5.99 $\chi^2 = 37.26$ df = 2

Interpretation : Table 40 shows that the value of χ^2 (calculated) is 37.26 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 41 : Effective leadership develops a well defined vision with staff in our school

	SA	**A**	**UN**
Observed (f_o)	50	30	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	20	0	-20
$(f_0 - f_e)^2$	400	0	400
$(f_0 - f_e)^2/f_e$	13.33	0.00	13.33

Table Value = 5.99 $\chi^2 = 26.66$ df = 2

Interpretation : Table 41 shows that the value of χ^2 (calculated) is 26.66 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted

Table 42 : Effective Leadership focuses on both instructional & facilitative leadership in our T / L situation

	SA	**A**	**UN**
Observed (f_o)	62	12	16
Expected (f_e)	30	30	30
($f_0 - f_e$)	32	-18	-14
$(f_0 - f_e)^2$	1024	324	196
$(f_0 - f_e)^2/f_e$	34.13	10.80	6.53

Table Value = 5.99 $\chi^2 = 51.46$ df = 2

Interpretation : Table 42 shows that the value of χ^2 (calculated) is 51.46 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 43 : Effective Leadership build a collaborative culture in our school

	SA	**A**	**UN**
Observed (f_o)	60	15	15
Expected (f_e)	30	30	30
($f_0 - f_e$)	30	-15	-15
$(f_0 - f_e)^2$	900	225	225
$(f_0 - f_e)^2/f_e$	30.00	7.50	7.50

Table Value = 5.99 $\chi^2 = 45.00$ df = 2

Interpretation : Table 43 shows that the value of χ^2 (calculated) is 45.00 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 44 : Effective Leadership empower teachers in decision making for all round improvement of school

	SA	**A**	**UN**
Observed (f_o)	64	21	5
Expected (f_e)	30	30	30
($f_0 - f_e$)	34	-9	-25
$(f_0 - f_e)^2$	1156	81	625
$(f_0 - f_e)^2/f_e$	38.53	2.70	20.83

Table Value = 5.99 $\chi^2 = 62.06$ df = 2

Interpretation : Table 44 shows that the value of χ^2 (calculated) is 62.06 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 45 : Emphasis on culture of teachers' leadership is rare in our school

	SA	**A**	**UN**
Observed (f_o)	34	36	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	4	6	-10
$(f_0 - f_e)^2$	16	36	100
$(f_0 - f_e)^2/f_e$	0.53	1.20	3.33

Table Value = 5.99 $\chi^2 = 5.06$ df =2

Interpretation : Table 45 shows that the value of χ^2 (calculated) is 5.06 which is less than the table value and the result is not significant at 0.05 level. Therefore, the statement is rejected.

Table 46 : Climate of mutual trust & respect is very common criteria of our school

	SA	**A**	**UN**
Observed (f_o)	54	16	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	24	-14	-10
$(f_0 - f_e)^2$	576	196	100
$(f_0 - f_e)^2/f_e$	19.20	6.53	3.33

Table Value = 5.99 $\chi^2 = 29.06$ df = 2

Interpretation : Table 46 shows that the value of χ^2 (calculated) is 29.06 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted. It means broader area of subject matter does not cover for developing skills on achievement.

Table 47 : Effective leadership manage time effectively in our school

	SA	**A**	**UN**
Observed (f_o)	61	25	04
Expected (f_e)	30	30	30
($f_0 - f_e$)	31	-5	-26
$(f_0 - f_e)^2$	961	25	676
$(f_0 - f_e)^2/f_e$	32.03	0.83	22.53

Table Value = 5.99 $\chi^2 = 55.39$ df = 2

Interpretation : Table 47 shows that the value of χ^2 (calculated) is 55.39 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted. It means that academic achievement measures only cognitive domain.

Table 48 : Effective Leadership arrange parent / staff meetings effectively for improvement of our school

	SA	**A**	**UN**
Observed (f_o)	58	21	11
Expected (f_e)	30	30	30
($f_0 - f_e$)	28	-9	-19
$(f_0 - f_e)^2$	784	81	361
$(f_0 - f_e)^2/f_e$	26.13	2.70	12.03

Table Value = 5.99 $\chi^2 = 40.86$ df =2

Interpretation : Table 48 shows that the value of χ^2 (calculated) is 40.86 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 49 : Effective Leadership create organisational structure that involves all faculty in decision making for collaboration

	SA	**A**	**UN**
Observed (f_o)	53	17	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	23	-13	-10
$(f_0 - f_e)^2$	529	169	100
$(f_0 - f_e)^2/f_e$	17.630	5.63	3.33

Table Value = 5.99 $\chi^2 = 26.59$ df =2

Interpretation : Table 49 shows that the value of χ^2 (calculated) is 26.59 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 50 : Leadership help teachers deal with increased parental involvement

	SA	**A**	**UN**
Observed (f_o)	65	15	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	35	-15	-20
$(f_0 - f_e)^2$	1225	225	400
$(f_0 - f_e)^2/f_e$	40.83	7.50	13.33

Table Value = 5.99 $\chi^2 = 61.66$ df =2

Interpretation : Table 50 shows that the value of χ^2 (calculated) is 61.66 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted,.

Table 51 : A focus on student learning is always established by leadership in our school

	SA	**A**	**UN**
Observed (f_o)	58	22	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	28	-8	-20
$(f_0 - f_e)^2$	784	64	400
$(f_0 - f_e)^2/f_e$	26.13	2.13	13.33

Table Value = 5.99 $\chi^2 = 41.59$ df = 2

Interpretation : Table 51 shows that the value of χ^2 (calculated) is 41.59 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 52 : Careful monitoring of teacher and pupil progress is encouraged by leadership

	SA	**A**	**UN**
Observed (f_o)	56	24	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	26	-6	-20
$(f_0 - f_e)^2$	676	36	400
$(f_0 - f_e)^2/f_e$	22.53	1.20	13.33

Table Value = 5.99 $\chi^2 = 37.06$ df = 2

Interpretation : Table 52 shows that the value of χ^2 (calculated) is 37.06 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 53 : Effective Leadership develop school improvement plans from results of inquiry and reflection

	SA	A	UN
Observed (f_o)	61	19	10
Expected (f_e)	30	30	30
($f_0 - f_e$)	31	-11	-20
$(f_0 - f_e)^2$	961	121	400
$(f_0 - f_e)^2/f_e$	32.03	4.03	13.33

Table Value = 5.99 $\chi^2 = 49.39$ df = 2

Interpretation : Table 53 shows that the value of χ^2 (calculated) is 49.39 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 54 : Our leadership always puts attention to the needs of low-performing students

	SA	A	UN
Observed (f_o)	38	31	21
Expected (f_e)	30	30	30
($f_0 - f_e$)	8	1	-9
$(f_0 - f_e)^2$	64	1	81
$(f_0 - f_e)^2/f_e$	2.13	0.03	2.70

Table Value = 5.99 $\chi^2 = 4.86$ df =2

Interpretation : Table 54 shows that the value of χ^2 (calculated) is 4.86 which is less than the table value and the result is not significant at 0.05 level. Therefore, the statement is rejected.

Table 55 : Our leadership always disseminate information widely

	SA	A	UN
Observed (f_o)	50	20	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	20	-10	-10
$(f_0 - f_e)^2$	400	100	100
$(f_0 - f_e)^2/f_e$	13.33	3.33	3.33

Table Value = 5.99 $\chi^2 = 19.99$ df = 2

Interpretation : Table 55 shows that the value of χ^2 (calculated) is 19.99 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted. It suggests that information be provided visually.

Table 56 : Most of the curriculum is not covered in allotted classes

	SA	A	UN
Observed (f_o)	41	25	24
Expected (f_e)	30	30	30
($f_0 - f_e$)	11	-5	-6
$(f_0 - f_e)^2$	121	25	36
$(f_0 - f_e)^2/f_e$	4.03	0.83	1.20

Table Value = 5.99 $\chi^2 = 6.06$ df =2

Interpretation : Table 56 shows that the value of χ^2 (calculated) is 6.06 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 57 : No continuity exists between secondary curriculum and higher secondary curriculum

	SA	A	UN
Observed (f_o)	42	18	30
Expected (f_e)	30	30	30
($f_0 - f_e$)	12	-12	0
$(f_0 - f_e)^2$	144	144	0
$(f_0 - f_e)^2/f_e$	4.80	4.80	0.00

Table Value = 5.99 $\chi^2 = 9.60$ df =2

Interpretation : Table 57 shows that the value of χ^2 (calculated) is 9.60 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 58 : Most of the curriculum in is not logically cited

	SA	A	UN
Observed (f_o)	56	14	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	26	-16	-10
$(f_0 - f_e)^2$	676	256	100
$(f_0 - f_e)^2/f_e$	22.53	8.53	3.33

Table Value = 5.99 $\chi^2 = 34.39$ df =2

Interpretation : Table 58 shows that the value of χ^2 (calculated) is 34.39 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 59 : Curriculum should be practical based

	SA	A	UN
Observed (f_o)	63	10	17
Expected (f_e)	30	30	30
($f_0 - f_e$)	33	-20	-13
$(f_0 - f_e)^2$	1089	400	169
$(f_0 - f_e)^2/f_e$	36.30	13.33	5.63

Table Value = 5.99 $\chi^2 = 55.26$ df = 2

Interpretation : Table 59 shows that the value of χ^2 (calculated) is 55.26 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

Table 60 : Teachers are used to give remedial teaching for the betterment of students for effective curriculum transaction

	SA	A	UN
Observed (f_o)	60	18	12
Expected (f_e)	30	30	30
($f_0 - f_e$)	30	-12	-18
$(f_0 - f_e)^2$	900	144	324
$(f_0 - f_e)^2/f_e$	30.00	4.80	10.80

Table Value = 5.99 $\chi^2 = 45.60$ df = 2

Interpretation : Table 60 shows that the value of χ^2 (calculated) is 45.60 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted. Feed back in teaching learning process works as hidden force which motivate and students for further improvement.

Table 61 : There is no scope of in-depth study in curriculum

	SA	**A**	**UN**
Observed (f_o)	48	22	20
Expected (f_e)	30	30	30
($f_0 - f_e$)	18	-8	-10
$(f_0 - f_e)^2$	324	64	100
$(f_0 - f_e)^2/f_e$	10.80	2.13	3.33

Table Value = 5.99 $\chi^2 = 16.26$ df = 2

Interpretation : Table 61 shows that the value of χ^2 (calculated) is 16.26 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted.

CHAPTER – V

SUMMARY, FINDINGS AND CONCLUSION

CHAPTER – V
SUMMARY, FINDINGS AND CONCLUSION

5.1 Summary

With the growing complexity of the educational system due to the tremendous achievement of information in various educational fields teaching learning system which accompanies with mechanism of it makes the teaching learning system more relevant and productive experimented with the model of teaching with the help of the components extracted from review of related studies followed by t-test and Chi Square analysis.

5.2 Objectives of the Study

1. To study the Effective Teaching Learning System in Physical Science at some selected secondary level schools in West Bengal.
2. To construct a standardize questionnaire of Physical Science regarding Effective Teaching Learning System.
3. To find out the components of Effective Teaching Learning System on the basis of review of studies.
4. To determine significance level for Effective Teaching Learning System on the basis of locality.
5. To determine significance level for Effective Teaching Learning System on the basis of gender.
6. To find out mechanism of Teaching Learning System by applying a model in an experimental condition.

5.3 Methodology

The study was survey type descriptive research.

Tools :

A **s**tandardized questionnaire regarding Effective Teaching Learning System was used for conducting the study.

Sample :

Ninth grade students of some selected schools of Bankura district in West Bengal were considered as sample for conducting the study. Sampling technique was purposive in nature. Two hundred samples were taken randomly for conducting the t-test and 90 samples were taken for Chi Square Test.

5.4 Findings

5.4.1 Findings–1 : Effective Components extracted from Review of Related Studies

1. Instructional Strategy.
2. Policy and Goals.
3. Reasoning.
4. School Environment.
5. Student-Teacher Relationship.
6. Quality of Curriculum.
7. Effective Leadership.
8. Evaluation System

5.4.2 Inferential Statistics

Hypotheses :

1. There is no difference of Instructional Strategy between boys and girls.
2. There is no difference of Policy and Goals between boys and girls.
3. There is no difference of Reasoning between boys and girls.
4. There is no difference of School Environment between boys and girls.
5. There is no difference of Student-Teacher Relationship between boys and girls.

6. There is no difference of Quality of Curriculum between boys and girls.
7. There is no difference of Effective Leadership between boys and girls.
8. There is no difference of Evaluation System between boys and girls.
9. There is no difference of mean between urban and rural areas in relation to Instructional Strategy.
10. There is no difference of mean between urban and rural areas in relation to Policy and Goals.
11. There is no difference of Reasoning between urban and rural areas.
12. There is no difference of School Environment between urban and rural areas.
13. There is no difference of Student-Teacher Relationship between urban and rural areas.
14. There is no difference of Quality of Curriculum between urban and rural areas.
15. There is no difference of Effectiveness of Leadership between urban and rural areas.
16. There is no difference of Evaluation System between urban and rural areas.

5.4.3 Hypotheses Testing

Hypothesis	t	Significant level
1	13.72	**
2	4.66	**
3	4.89	**
4	9.53	**
5	7.13	**
6	3.30	**
7	2.88	**
8	6.74	**

Hypothesis	t	Significant level
9	4.66	**
10	14.95	**
11	9.53	**
12	6.69	**
13	2.53	*
14	6.32	**
15	7.18	**
16	5.93	**

n = Total observations of 100 in each group.

t at 0.05 level = 1.97, t at 0.01 level = 2.60, df = 198

*Sig. at 0.05 level, **Sig. at 0.01 level,

5.4.4 Findings–2 from Hypotheses Testing

All the hypotheses are significant which are based on locality and gender differences and therefore accepted and the corresponding null hypotheses are rejected.

5.4.5 Interpretation from Chi Square Test

Interpretation : Table 27 shows that the value of χ^2 is found to be 53.59 which is greater than the table value of 5.99. Hence, the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 28 shows that the value of χ^2 (calculated) is 21.66 which is greater than the table value of 5.99. Hence, the result is significant at 0.05 level, Therefore, the statement is accepted.

Interpretation : Table 29 shows that the value of χ^2 (calculated) is 2.86 which is less than the table value of 5.99 and the result is not significant at 0.05 level. Therefore, the statement is rejected.

Interpretation : Table 30 shows that the value of χ^2 is found to be 17.86 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 31 shows that the value of χ^2 is 29.26 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 32 shows that the value of χ^2 (calculated) is 46.66 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 33 shows that the value of χ^2 (calculated) is 61.66 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 34 shows that the value of χ^2 is found to be 19.99 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 35 shows that the value of χ^2 (calculated) is 29.26 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 36 shows that the value of χ^2 (calculated) is 20.86 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted

Interpretation : Table 37 shows that the value of χ^2 (calculated) is 38.46 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 38 shows that the value of χ^2 (calculated) is 40.06 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 39 shows that the value of χ^2 (calculated) is 10.39 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 40 shows that the value of χ^2 (calculated) is 37.26 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 41 shows that the value of χ^2 (calculated) is 26.66 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted

Interpretation : Table 42 shows that the value of χ^2 (calculated) is 51.46 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 43 shows that the value of χ^2 (calculated) is 45.00 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 44 shows that the value of χ^2 (calculated) is 62.06 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 45 shows that the value of χ^2 (calculated) is 5.06 which is less than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is rejected.

Interpretation : Table 46 shows that the value of χ^2 (calculated) is 29.06 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 47 shows that the value of χ^2 (calculated) is 55.39 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 48 shows that the value of χ^2 (calculated) is 40.86 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 49 shows that the value of χ^2 (calculated) is 26.59 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 50 shows that the value of χ^2 (calculated) is 61.66 which is greater than the table value and the result is significant at 0.05 level. Therefore, the statement is accepted,.

Interpretation : Table 51 shows that the value of χ^2 (calculated) is 41.59 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 52 shows that the value of χ^2 (calculated) is 37.06 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 53 shows that the value of χ^2 (calculated) is 49.39 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 54 shows that the value of χ^2 (calculated) is 4.86 which is less than the table value of 5.99 and the result is not significant at 0.05 level. Therefore, the statement is rejected.

Interpretation : Table 55 shows that the value of χ^2 (calculated) is 19.99 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 56 shows that the value of χ^2 (calculated) is 6.06 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 57 shows that the value of χ^2 (calculated) is 9.60 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 58 shows that the value of χ^2 (calculated) is 34.39 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 59 shows that the value of χ^2 (calculated) is 55.26 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 60 shows that the value of χ^2 (calculated) is 45.60 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

Interpretation : Table 61 shows that the value of χ^2 (calculated) is 16.26 which is greater than the table value of 5.99 and the result is significant at 0.05 level. Therefore, the statement is accepted.

5.5 Conclusion

It is observed from the present study, Effective Teaching Learning System requires multiple dimensions which involves a holistic approach for Teaching Learning System in a better way.

From Chi Square values, different aspects of Teaching Learning System were found for productive education.

From t-test it was identified that Teaching Learning System can vary with respect to gender and locality.

For mechanism of Teaching Learning System, a model was applied in an experimental condition on the basis of some strategies and it was found adjusted mean score was better in that experimental condition.

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APPENDIX

APPENDIX

QUESTIONNAIRE

(English Version)

(The tool has been prepared for collecting data from students of secondary schools in West Bengal for Ph. D. Degree)

Researcher

Amarnath Das

Supervisor

Dr. Dibyendu Bhattacharyya

Students are requested to give '✓' marks for their correct choice and their opinion will be kept confidential.

Name.....

Name of the School.....

District.....

	Agreed	Disagreed	No Comments
1. In effective school, teachers engage students by good teaching.			
2. Class size and student population are small to make a school effective.			
3. High expectations and clear consequences are articulated to students frequently for effective school.			
4. Structured classroom routines provide stability and direction for effective school.			
5. Effective schools consider time spent on academic and non-academic learning.			
6. Balance of workload i.e. time focused on T/L & time spent on administrative tasks is maintained in effective school-3.			
7. Strategy for planning & implementing pedagogical change.			
8. Assessment & Reporting practices are integral to the T/L process in effective school.			
9. Effective school frames good curriculum planning which support councils, leaders & teachers to work cohesively.			
10. Effective teaching is enhanced by challenging class-room climate .			
11. Effective teaching depends on positive classroom environment that does not allow sleeping, talking, doing other work, phone calls etc.			

	Agreed	Disagreed	No Comments
12. Effective teaching is "praising students' success" as it associates.			
13. Effective teaching depends on students' ratings, peer review, self evaluation, teaching portfolios & student achievement.			
14. Teaching depends on equity pedagogy.			
15. Effective leadership develops a well defined vision with staff in our school.			
16. Effective Leadership focuses on both instructional & facilitative leadership in our T / L situation.			
17. Effective Leadership build a collaborative culture in our school.			
18. Effective Leadership empower teachers in decision making for all round improvement of school.			
19. Emphasis on culture of teachers' leadership is rare in our school.			
20. Climate of mutual trust & respect is very common criteria of our school.			
21. Effective leadership manage time effectively in our school.			
22. Effective Leadership arrange parent / staff meetings effectively for improvement of our school.			
23. Effective Leadership create organisational structure that involves all faculty in decision making for collaboration.			

	Agreed	Disagreed	No Comments
24. Leadership help teachers deal with increased parental involvement.			
25. A focus on student learning is always established by leadership in our schools.			
26. Careful monitoring of teacher & pupil progress is encouraged by leadership.			
27. Effective Leadership develop school improvement plans from results of inquiry & reflection.			
28. Our leadership always puts attention to the needs of low-performing students.			
29. Our leadership always disseminate information widely.			
30. Most of the curriculum is not covered in allotted classes.			
31. No continuity exists between secondary Curriculum and higher secondary curriculum.			
32. Most of the curriculum in is not logically cited.			
33. Curriculum should be practical based.			
34. Teachers are used to give remedial teaching for the betterment of students for effective curriculum transaction.			
35. There is no scope of in-depth study in curriculum.			