SECTION I
INTRODUCTION

At the heart of teacher education is the question 'What value does teacher education add to the prospective teacher's ability to face challenges of facilitating the development of critical and creative students and subsequently adults?' Reform of teacher education has been one of the abiding concerns in the reports of major Education Commissions and Committees on education.

Teacher education as a whole needs urgent and comprehensive reform. There is a need to bring greater convergence between professional preparation and continuing professional development of teachers at all stages of schooling in terms of level, duration and structure. Considering the complexity and significance of teaching as a professional practice, it is imperative that the entire enterprise of teacher education should be raised to a universal level and that the duration and rigor of programme should be appropriately enhanced.These areas are particularly significant to the professional development of teachers at all stages, both in their initial and in-service training.

It is recognized that, to assist teachers in adapting to their changing occupational roles in schools and society, much innovation and reform is necessary in the professional training of teachers, in the professional support services available, and in the use of non-formal and informal teacher education methods and distance education. It is only through such innovation and reform that the career-long professional development of teachers is possible.

All of these new challenges for teachers, which have occurred as a result of significant developments, innovations and reforms in the education systems, have resulted in an increase in the diversity, complexity and responsibilities associated with the teacher's role. They also have far-reaching and challenging implications for changes in the occupational status of teachers, some of which are yet to be fully realized. What is to be worked towards is a situation in which, as the demands and responsibilities of teachers increase, an appropriate advance in status and reward occurs. The status of the teaching profession depends to a considerable extent on teacher educators and teachers themselves.

It is therefore suggested that both teacher educators and teachers seek to achieve the highest possible standards in their entire professional endeavor and, in so doing, become professionals.

Learning is not confined to the four walls of the classroom. For this to happen there is a need to connect knowledge to life outside the school and enrich the curriculum by making it less textbook-centered. This is also applicable to teacher Education. The training of teachers is a major area of concern at present as both pre-service and in-service training of school teachers are extremely inadequate and poorly managed in most states. Pre-service training needs to be improved and differently regulated both in public and private institutions, while systems for in-service training require expansion and major reform that allow for greater flexibility. There exists a wide variation in the status of teachers and the need for teachers at different levels of school education across the country.

1.1 Shifting Paradigm of Education: Behaviorism to Constructivism

The NCF 2005 demands a teacher to be a facilitator of children's learning in a manner that helps children to construct knowledge and meaning. The teacher in this process is a co-constructor of knowledge. It also opens out possibilities for the teacher to participate in the construction of syllabi, textbooks and teaching-learning materials. Such roles demand that teachers be equipped with an adequate understanding of curriculum, subject-content and pedagogy. The launch of the massive Sarva Shiksha Abhiyan (SSA) in 2002 and the financial commitment and education to augment the UEE mission have underscored the need to prepare the teachers adequately to address the growing demand for quality education. A similar demand may arise in the context of the impending universalization of secondary education in the coming years. The continued decline in quality of the state school system and the proliferation of sub-standard unregulated private schools pose several challenges to the national declaration of catering to the basic learning needs.

There is now a public acknowledgement that the current system of schooling imposes tremendous burden on our children. This burden arises from an incoherent curriculum structure that is often dissociated from the personal and social milieu of

children as also from the inadequate preparation of teachers who are unable to make connections with children and respond to their needs in imaginative ways. Teachers need to be creators of knowledge and thinking professionals. They need to be empowered to recognize and value what children learn from their home, social and cultural environment and to create opportunities for children to discover, learn and develop. The recommendations of the NCF2005 on school curriculum are built on this plank.

Educationists are also of the view that the burden arises from treating knowledge as a 'given', as an external reality existing outside the learner and embedded in textbooks. This view of education points to the need to take a fresh look at teacher preparation. Education is not a mechanical activity of information transmission and teachers are not information dispensers. Teachers need to be looked at as crucial mediating agents through whom curriculum is transacted and knowledge is co-constructed along with learners. Textbooks by themselves do not help in developing knowledge and understanding.

1.2 Constructivism: Concept and Meaning

Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in. Each of us generates our own "rules" and "mental models," which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences.

Constructivism is a type of learning theory that explains human learning as an active attempt to construct meaning in the world around us. Constructivists believe that learning is more active and self-directed than either behaviorism or cognitive theory would postulate.

Teaching philosophy based on the concept that learning (cognition) is the result of 'mental construction' Students construct their own understanding by reflecting on their personal experiences, and by relating the new knowledge with what they already know. Each student creates his or her own 'schemas' or mental-models to make sense of the world, and accommodates the new knowledge (learns) by adjusting them. One of its

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main principles is that learning is search for meaning, therefore, to be effective, a teacher must help the student in discovering his or her own meaning.

Constructivism divides learning into two types: accommodation and assimilation. The focus is on the individual's desire and ability to learn, and the teacher or therapist is merely there to help guide self-directed learning.

1.2.1 Historical Roots of Constructivism

Constructivism can be traced out from early period of Socrates. Socrates developed a systematic method of discovering truth by combining questioning and logical reasoning, Jean Piaget's theory of cognitive, Vygotskys Social Learning theory, Jerome Bruners theory of Constructivism and Radical Constructivism Von Glacerfeld collectively contributed the development of Constructivism.

Constructivist theory is descriptive rather than prescriptive; it does not prescribe rigid rules or procedures for designing a learning environment (Wasson 1996). Because the constructivist view of learning evolved from cognitivism, it shares several similarities with cognitive learning theories. What distinguishes constructivism from cognitivism is the notion that "knowledge does not and cannot have the purpose of producing an independent reality, but instead it has an adaptive function" (Glasersfeld 1995).

The philosophy of constructivism evolved from dissatisfaction with traditional Western theories of knowledge. As such, it contrasts sharply with objectivist epistemology and positivism

In contrast to the objectivist notion of objective truth and meaning inherent in objects, independent of any consciousness, constructivism postulates that knowledge cannot exist outside our minds; truth is not absolute; and knowledge is not discovered but constructed by individuals based on experiences (Crotty 1998, 42; Fosnot 1996; Hendry, Frommer, and Walker

1.2.1.1 Piaget's Theory

As behavior balances the structure of the organism against the characteristic of the environment (Fosnot 1996). Behaviors, Piaget believed, serve as the driving force of

developing new cognitive structures.

Piaget believed that an individual encountering a new learning situation draws on prior knowledge to make the new experience understandable (Gillani 2003). A new event, situation, or learning environment can create contradictions with one's previous understandings; their insufficiency leads to perturbation and a state of disequilibration in the mental schemata, in which generic events and abstract concepts are stored and organized in terms of their common patterns (Fosnot 1996; Gillani 2003; Palincsar 1998). To form a state of equilibrium in the cognitive structure, the individual needs to modify or reorganize his or her schemata via adaptation.

The internal process of restructuring the schemata is accomplished through assimilation and accommodation (Gillani 2003). While assimilation integrates new information with existing knowledge, accommodation modifies or transforms existing cognitive structures in response to a new situation. According to Piaget, learners confronted with an imbalance may resort to three kinds of accommodations (Fosnot 1996):

1) Disregarding the contradictions and adhering to their original scheme;
2) Vacillating by maintaining the contradictory theories simultaneously and viewing each theory as separate or specific cases; or
3) Forming a new, modified notion to explain and resolve the prior contradiction.

In each type of response, the learner's internal and self-regulatory behavior leads to the compensations.

Glasersfeld (1996) explains Piaget's theory in terms of its epistemological underpinnings. The application of the Piagetian notion of adaptation to cognitive structures implies that knowledge is not a representation of external reality but a map of actions and conceptual operations.

1.2.1.2 Key Ideas in Piaget's Theory

Following are the key ideas in Piagets Theory:

- Children are active and motivated learners.
- Children literally construct and reconstruct their knowledge of the world as they mature and advance their levels of cognitive functioning.

- Children continuously organize, structure, and restructure experiences in relation to existing schemas of thought.
- Children adapt to other environments through the process of assimilation and accommodation.
- Assimilation is a process of dealing with an object or event in a way that is consistent with an existing scheme that the child has created through his/her experiences.
- Accommodation: Two Forms: Children will either modify an existing scheme to account for the new object or Children will form an entirely new scheme to deal with it.

1.3 Vygotsky's Theory

Vygotsky's theories come into play in shaping constructivist pedagogy.

Four key principles derived from Vygotsky's ideas have played an important role [in modern constructivist thought]. Two of them are very important for cooperative learning. First is his emphasis on the social nature of learning. Children learn, he proposed, through joint interactions with adults and more capable peers. On cooperative projects children are exposed to their peers' thinking processes; this method not only makes the learning outcome available to all students, but also makes other students' thinking processes available to all.

Vygotsky noted that successful problem solvers talk themselves through difficult problems. In cooperative groups, children can hear this inner speech out loud and can learn how successful problem solvers are thinking through their approaches.

The second key concept is the idea that children learn best the concepts that are in their zone of proximal development. When children are working together, each child is likely to have a peer performing on a given task at a slightly higher cognitive level, exactly within the child's zone of proximal development.

1.3.1 Socio-cultural Perspective of Lev Vygotsky's Theory

Socio cultural Perspectives of Lev Vygotskys theory was described as follows:

- This theory proposed that adults promote children's cognitive development by engaging them in meaningful and challenging activities, helping them to perform those activities successfully, and talking with them about their experiences.
- It also believed that children's mental, language, and social development are enhanced by learning that occurs through social interactions.
- He emphasized the importance of society and culture for promoting cognitive growth.
- His theory is sometimes called the socio-cultural perspective because he emphasized the importance of society and culture for promoting cognitive growth.
- Although he never had the chance to develop his theory fully, his ideas are clearly evident in our views of child development and classroom practices.
- Complex mental processes begin as social activities; as children develop, they gradually internalize the processes they use in social contexts and begin to use them independently.
- Thoughts and language become increasingly interdependent in the first years of life.
- Through both informal interactions and formal schooling, adults convey to children the ways in which their cultures interprets and responds to the world.
- Children can perform more challenging tasks when assisted by more advanced and competent individuals.

An important concept for social constructivists is that of *scaffolding* which is a process of guiding the learner from what is presently known to what is to be known. According to Vygotsky (1978), students' problem solving skills fall into three categories:

1. Skills which the student cannot perform
2. Skills which the student may be able to perform
3. Skills that the student can perform with help

Scaffolding allows students to perform tasks that would normally be slightly beyond their ability without that assistance and guidance from the teacher. Appropriate teacher support can allow students to function at the cutting edge of their individual development. Scaffolding is therefore an important characteristic of constructivist learning and teaching

1.4 Von Glasersfeld Theory

Von Glasersfeld's radical constructivism is based on two premises: (a) knowledge is not passively received, but actively constructed by people; and (b) the purpose of human constructions is adaptive, not representational.

1. Ernst von Glasersfeld was a prominent proponent of radical constructivism, which claims that knowledge is not a commodity which is transported from one mind into another; rather, it is up to the individual to "link up" specific interpretations of experiences and ideas with their own reference of what is possible and viable.
2. That is, the process of constructing knowledge is dependent on the individual's subjective interpretation of the experience not what "actually" occurred. For example, a teacher has the responsibility of ensuring the student can makes sense of the material being taught through the consideration of how the student will interpret the work rather than repeating phrases, words and definitions in the way the teacher sees fit.
3. Further since knowledge is a subjective construct rather than a compilation of empirical data, it is impossible to know the extent to which knowledge reflects an ontological reality
4. Von Glasersfeld describes constructivism as, "a theory of knowledge with roots in philosophy, psychology, and cybernetics" Simply stated, it is a learning process which allows a student to experience an environment first-hand, thereby, giving the student reliable, trust-worthy knowledge. The student is required to act upon the environment to both acquire and test new knowledge.

1.5 Bruner's Theory on Constructivism

Bruner's theory on constructivism encompasses the idea of learning as an active process wherein those learning are able to form new ideas based on what their current knowledge is as well as their past knowledge. A cognitive structure is defined as the mental processes which offer the learner the ability to organize experiences and derive meaning from them. These cognitive structures allow the learner to push past the given information in constructing their new concepts. The learner, often a child, will take pieces of their past knowledge and experiences and organize them to make sense of what they know, then base further concepts and solve additional problems based upon a combination of what they already processed and what they think should be processed next.

The four major principles of Bruner's theory on constructivism encompass

1) A predilection toward learning.
2) How a grouping of knowledge is able to be constructed to best be understood by the learner.
3) Which are the effective manners for the teacher to present said material to the learner,
4) The progression of rewards as well as punishments.

1.6 Assumptions and Principles of the Constructivist View of Learning

The basic assumptions and principles of the constructivist view of learning summarizing the above mentioned theories on Constructivism the following principles related to Learning can be listed as follows:

- Learning is an active process.
- Learning is an adaptive activity.
- Learning is situated in the context in which it occurs.
- Knowledge is not innate, passively absorbed, or invented but constructed by the learner.
- All knowledge is personal and idiosyncratic.
- All knowledge is socially constructed.

- Learning is essentially a process of making sense of the world.
- Experience and prior understanding play a role in learning.
- Social interaction plays a role in learning.
- A view of learning based on the belief that knowledge isn't a thing that can simply be given by the teacher at the front of the room to students in their desks.
- Students learn by fitting new information together with what they already know
- Learners are the builders and creators of meaning and knowledge
- Knowledge is constructed by learners through an active, mental process of development

1.7 Characteristics of Constructivist Learning and Teaching

After studying the above theoretical base the following characteristics of constructivist learning and teaching can be summarized:

1. Goals and objectives are derived by the student or in negotiation with the teacher or system.
2. Teachers serve in the role of guides, monitors, coaches, tutors and facilitators.
3. Activities, opportunities, tools and environments are provided to encourage Meta cognition, self-analysis -regulation, -reflection & awareness.
4. The student plays a central role in mediating and controlling learning.
5. Learning situations, environments, skills, content and tasks are relevant, realistic, and authentic and represent the natural complexities of the 'real world'.
6. Primary sources of data are used in order to ensure authenticity and real-world complexity.
7. Knowledge construction should be emphasized and not reproduction is emphasized.

8. This construction takes place in individual contexts and through social negotiation, collaboration and experience.
9. The learner's previous knowledge constructions, beliefs and attitudes should be considered in the knowledge construction process.
10. Problem-solving, higher-order thinking skills and deep understanding should be emphasized.
11. Errors provide the opportunity for insight into students' previous knowledge constructions.
12. Exploration is a favored approach in order to encourage students to seek knowledge independently and to manage the pursuit of their goals.
13. Learners are provided with the opportunity for apprenticeship learning in which there is an increasing complexity of tasks, skills and knowledge acquisition.
14. Knowledge complexity is reflected in an emphasis on conceptual interrelatedness and interdisciplinary learning.
15. Collaborative and cooperative learning are favored in order to expose the learner to alternative viewpoints.
16. Scaffolding is facilitated to help students perform just beyond the limits of their ability.
17. Assessment is authentic and interwoven with teaching.

If one is willing to apply these principles in Classroom situations. He/ She have to understand the changed role of student and teacher.

A teacher in a traditional classroom is the primary source of information and authority. In a constructivist classroom, the teacher acts as a facilitator, assisting students in pursuit of knowledge. Traditional teachers are assumed to disseminate knowledge. Constructivist teachers interact with students, helping them construct their own learning. Constructivist teachers value students' points of view and compel their participation in classroom activities, rather than expecting silent and passive attentiveness as is the norm in traditional classrooms.

As a theory, constructivism proposes that learning is neither a stimulus response phenomenon nor a passive process of receiving knowledge; instead, as an adaptive activity requiring building conceptual structures and self-regulation through reflection and abstraction, learning is an active process of knowledge construction influenced by how one interacts with and interprets new ideas and events (Lambert et al. 1995; Maclellan and Soden 2004; Glasersfeld 1995). "Individuals bring past experiences and beliefs, as well as their cultural histories and world views, into the process of learning" when they construct knowledge internally by interacting with environment (Kamii, Manning, and Manning 1991).

This perspective views developmental stages as constructions of active learner reorganization. Likewise, it sets concept development and "deep" understanding, rather than behaviors or skills, through "authentic" tasks, as the goal of instruction (Fosnot 1996, 10–11).

Piaget's genetic epistemology or theory of cognitive development provides one of the building blocks of constructivist pedagogy. Drawing on biological concepts such as the concept of equilibrium-disequilibrium,Piaget attempted to explain how learning and the changes in cognitive structures occur (Fosnot 1996; Gillani 2003; Palincsar 1998). From his perspective, intellectual and cognitive development resembles a biological act that requires the organism's adaptation to environmental demands (Gillani 2003). Behavior and the organism stand as a whole system; thus any changes in one part of the system will cause other changes.

1.7.1 Change in Students' Roles

Students in a traditional classroom are passive. They listen and react to the teacher's direct instruction. In a constructivist classroom, students are active. They exchange ideas with the teacher and with one another. Students in a traditional classroom are considered "blank slates." All learning in the traditional arena is isolated, unconnected with the world and students' backgrounds. Students in a constructivist classroom are expected to connect all learning to prior knowledge. This leads to greater internalization

and comprehension of facts and concepts. Students in constructivist classes work in groups rather than alone as is usual in the traditional classroom.

- The students are the center of attention, not the teacher
- Students are placed in groups, they work together to find meaning
- Each student takes on a different objective or part of the assignment or project
- They become "experts" on their subject
- Students teach one another to become experts on their 'piece of the puzzle'
- Together, as a whole, the group becomes experts from one another

1.7.2 Change in Roles of the Teacher

- The teacher is facilitator, guide on the side NOT mentor in the middle
- Watching and observing each and every behavior of each student.
- Listening carefully to each student.
- Asking questions to learn about students.
- Having the ability to observe and listen to one's students and their experiences in the classroom contributes to his other ability to use a constructivist approach.
- A constructivist approach contributes to one's ability to observe and listen in the classroom.

1.8 Principles of Knowledge Construction

Jonassen (1994) summarizes what he refers to as "the implications of constructivism for instructional design". The following principles illustrate how knowledge construction can be facilitated:

1. Provide multiple representations of reality;
2. Represent the natural complexity of the real world;
3. Focus on knowledge construction, not reproduction;

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4. Present authentic tasks (contextualizing rather than abstracting instruction);
5. Provide real-world, case-based learning environments, rather than pre-determined instructional sequences;
6. Foster reflective practice;
7. Enable context-and content dependent knowledge construction;
8. Support collaborative construction of knowledge through social negotiation.

Ernest (1995) in his description of the many schools of thought of constructivism suggests the following implications of constructivism which derive from both the radical and social perspectives:

1. sensitivity toward and attentiveness to the learner's previous constructions;
2. diagnostic teaching attempting to remedy learner errors and misconceptions;
3. attention to meta cognition and strategic self-regulation by learners;
4. the use of multiple representations of concepts;
5. awareness of the importance of goals for the learner, and the dichotomy between learner and teacher goals;
6. Awareness of the importance of social contexts, such as the difference between folk or street mathematics and school mathematics (and an attempt to exploit the former for the latter).

After reviewing the principles of Knowledge construction, now it is necessary to understand how these principles can be implemented to actual real teaching. For this implementation, one has to know the designs of learning environment in classroom.

1.9 Goals for the Design of Constructivist Learning Environments

Honebein (1996) describes seven goals for the design of constructivist learning environments:

1. Provide experience with the knowledge construction process;
2. Provide experience in and appreciation for multiple perspectives;
3. Embed learning in realistic and relevant contexts;
4. Encourage ownership and voice in the learning process;
5. Embed learning in social experience;
6. Encourage the use of multiple modes of representation;
7. Encourage self-awareness in the knowledge construction process.

Putting constructivist pedagogical ideas into practice effectively and with integrity first necessitates teachers' willingness to embrace and practice principles of constructivist pedagogy. And doing so in turn requires teachers to examine their deeply held philosophies of teaching more precisely, their conceptions of teaching to become conscious of whether they tend to value traditional teacher-centered or constructivist learner-centered conceptions of teaching.

Rather than examine technical aspects of teaching, they first can reflect on and formulate their answers to such important conceptual questions as how learning occurs; how the teacher can facilitate the learning process or what roles the teacher should play in student learning; what kinds of learning environments help realize the goals of schooling in general and of school subjects in particular; and how students' learning should be evaluated.

If the goals of teaching school subjects are to be successfully accomplished, teachers of different subject areas should transform students' engagement in subject matters from rote recall and comprehension to more meaningful analysis, synthesis, application, and evaluation via constructivist teaching models and methods.

1.10 Review of Related Literature and Researches

Review of previous researches and literature explore multifaceted, complex nature of phenomenon under investigation. It enables researcher to comprehend aspects, sub

aspect of problems on various level and also develop skills, attitude to manipulate the problem.

Bligh, D. A. (2000). What's the Use of Lectures? San Francisco: Jossey-Bass. The book is a thorough examination of what lectures can and cannot do in terms of student learning. Research findings are discussed that inform the reader of when lectures should be employed, as well as what the instructor can expect outcomes in student learning and content retention to be as a result of having lectured.

Brown, L.M., Kelso, P.R., & Rexford, C. B. (2001). Introductory geology for elementary education majors utilizing a constructivist approach. Journal of Geoscience Education, 49(5), 450-453 The article outlines constructivist pedagogy in context of elementary educators' preparation to teach.

Dominik, Petko. (2012). reveals significant positive correlation between will, Skill and tool variables and the teacher is more often employs Constructivist forms of Teaching and Learning

Fosnot, (1996). suggests that several general principles of the constructivist view of learning can be applied to educational practices.

- Learning is not the result of development; learning is development.
- Disequilibrium facilitates learning. "
- Reflective abstraction is the driving force of learning.
- Dialogue within a community engenders further thinking.
- Learning proceeds toward developing structures

Fosnot, C. T. (Ed.) (1996). *Constructivism: Theory, Perspective, and Practice.* New York: Teachers College Press. The book is a compilation of articles exploring modern constructivism.Although many aspects of constructivism are approached, the first three chapters explore in detail where, when, and how constructivism developed. It provides a reader with a clear picture of what is meant by the modern term 'constructivism.'

Gergen, (1995) provides an explanation of radical constructivism by using esoteric terms borrowed from Moshman's (1982) classification of perspectives on constructivism as endogenous, exogenous, and dialectical. The first view emphasizes the

individual's knowledge construction based on previous knowledge and experiences; the second, the role of environment or social context in knowledge construction; and the third, the relationship of various types of dynamic interactions between the individual and the environment.

. **Hansen, E.J. (1998).** Creating Teachable Moments and Making Them Last. *Innovative Higher Education*, 23(1), 7-26. The article discusses issues related to content concerns in inquiry classrooms. It is noted cognitive dissonance and critical self-reflection on the part of the learner is needed for meaningful, sustained knowledge to develop regarding specific curricular content.

Lopez, R.E., & Schultz, T. (2001). Two Revolutions in K-8 Science Education. *Physics Today*, 54(9), 44-49.The article describes contemporary goals and objective of the Science Education community at large (as seen through the eyes of two Physics Educators).

Lord, T.R. (1997). A Comparison Between Traditional and Constructivist Teaching in College Biology. *Innovative Higher Education,* 21(3), 197-216. the article reports the findings of a study that assessed the learning of identical course content in two individual group treatments: one group receiving traditional instruction (n=86) and another receiving student centered constructivist instruction. It is found that the constructivist treated group out-performed the traditionally taught cohort on identical evaluations.

Lord, T. (1998). Cooperative Learning that Really Works in Biology Teaching: Using Constructivist-Based Activities to Challenge Student Teams. *The American Biology Teacher*, 60(8), 580-588. This paper offers guidance in the development of constructivist, inquiry-based activities within classes utilizing team learning. A review of relevant literature offers advice regarding the use of constructivist approaches for teaching in biology, cooperative learning, and the development of useful inquiry-sensitive curricula, the management of cooperative learning, and the grading of cooperative learning tasks. Of note, useful lecture questioning strategies are discussed.

Mintzes, J. J., Wandersee, J. H., & Novack, J. D. (1998). Teaching Science for Understanding: A Human Constructivist View. San Diego: Academic Press. The book outlines a constructivist viewpoint of teaching and learning that is commented on by the

authors and widely shared within the Science Education community. The book is organized into three parts: 1) theory and research foundations for constructivism, 2) teaching/learning intervention strategies of the human constructivist perspective, and 3) an epilogue covering the implications for "meaningful learning, knowledge restructuring, and conceptual change: on ways of teaching science for understanding."

Michelle Ciminelli, Niagara University; Learning to Teach in a Constructivist Teacher Education Environment the author presents her process of understanding what 'constructivism' means, and how it applies to teaching in a Language Arts course for pre service teachers.

Marbach-Ad, G., & Claassen, L.A. (2001). Improving Students' Questions in Inquiry Labs. The American Biology Teacher, 63(6), 410-419. The authors informally describe a study in which they assessed a specific inquiry-based curriculum's ability to improve students' science question asking habits and abilities. Of the methods employed for teaching questioning techniques in science, it is found that explicit instruction most positively benefits students, though instruction through inquiry aides it.

Milner, Andrea. & Templin, R. (2011).studied on Constructivist Classroom: Contextual factors in a Life Science. It was found that students do appreciate and value working in the Learning Environment based on Constructivist Classroom.

Nargund-Joshi, Vanashri; Park Rogers, Meredith A.; Akerson, Valarie L. (2011), In 2005 India introduced a new National Curriculum Framework aimed at providing a more constructivist approach for learning for all subjects. Previous research on the impact of curriculum reform in other countries (e.g., United States) concluded that for reform to be successful teachers' orientations toward teaching and learning must be considered early on.

Radford, Luis; Roth, Wolff-Michael, (2011) highlights on sociocultural alternative to contemporary Constructivist conceptions of classroom interaction. Drawing on the work of Vygotsky and Leont'ev, they introduce an approach that offers a new perspective through which to understand the "specifically human" forms of knowing.

Richardson, (2003). calls constructivist pedagogy "the creation of classroom environments, activities, and methods that are grounded in a constructivist theory of learning, with goals that focus on individual students developing deep understandings in the subject matter of interest and habits of mind that aid in future learning."

Richardson, (2003) identifies several principles as the premises of the constructivist pedagogy. These principles suggest that the teacher first recognize and respect students' backgrounds, beliefs, assumptions, and prior knowledge; provide abundant opportunities for group dialogue aimed at fostering shared understanding of the topic under study; establish a learning environment that encourages students to examine, change, and even challenge their existing beliefs and understandings through meaningful, stimulating, interesting, and relevant instructional tasks; help students develop meta-awareness of their own understandings and learning processes; and introduce the formal domain of knowledge or subject matter into the conversation through a sort of loosely structured instruction and the use of technological tools such as Web sites.

Redish, E.F., & Steinberg, R.N. (1999). Teaching Physics: Figuring Out what Works *Physics Today*, 52(1), 24-30. The authors explore three veins of contemporary research in Physics Education: 1) student understanding of physics, 2) student attitudes in physics classes and conceptions and their comprehension of physics, and 3) student responses to instruction in physics. In light of the issues raised in the discussion of these points of interest, the article closes with a discussion of implication for teaching.

Trowbridge, J.E., & Wandersee, J.A. (1994). Identifying Critical Junctures in Learning in a College Course on Evolution. *Journal of Research in Science Teaching*, 31(5), 459-473.

The article reports the findings of a study designed to assess the impact of the inclusion of concept mapping as a tool for student understanding and knowledge construction in a college course in evolution. It is found that the use of concept maps may aide instructors in determining when students are approaching or has past key junctures in the learning of key concepts; moreover, students that engaged in concept mapping tend to spend more time actively in study.

Waleed, Sultan& Charles,Peter. (2011). Focused on a study of Constructivist approach for digital learning to investigate the influence of Constructivist learning Environments.

Yilmaz, kaya (2008) focuses on Constructivism and its implications for classroom practices. To that end, it first describes the basic features of constructivism along with its major forms or variations. It then elucidates the constructivist view of knowledge, learning, teaching, and the relationship among these constructs. More specifically, it explains the assumptions and principles of constructivist pedagogy, bringing to the fore its core characteristics that differ fundamentally from other instructional paradigms. Last, the article presents how constructivism as a learning theory can guide the process of learning and teaching in real classroom settings. Learning theories are indispensable for effective and pedagogically

1.11 Origin of the Research Problem

Teacher education as a whole needs urgent and comprehensive reform. There is a need to bring greater convergence between professional preparation and continuing professional development of teachers at all stages of schooling in terms of level, duration and structure. Considering the complexity and significance of teaching as a professional practice, it is imperative that the entire enterprise of teacher education should be raised to a universal level and that the duration and rigor of programme should be appropriately enhanced.

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All of these new challenges for teachers, which have occurred as a result of significant developments, innovations and reforms in the education systems of Member Countries, have resulted in an increase in the diversity, complexity and responsibilities associated with the teacher's role. They also have far-reaching and challenging implications for changes in the occupational status of teachers, some of which are yet to be fully realized.

What is to be worked towards is a situation in which, as the demands and responsibilities of teachers increase, an appropriate advance in status and reward occurs. The status of the teaching profession depends to a considerable extent on teacher educators and teachers themselves. It is therefore suggested that both teacher educators and teachers seek to achieve the highest possible standards in all of their professional endeavors—and, in so doing, become professionals.

Learning is not confined to the four walls of the classroom. For this to happen there is a need to connect knowledge to life outside the school and enrich the curriculum by making it less textbook-centered. The training of teachers is a major area of concern at present as both pre-service and in-service training of school teachers are extremely inadequate and poorly managed in most states. Pre-service training needs to be improved and differently regulated both in public and private institutions, while systems for in-service training require expansion and major reform that allow for greater flexibility. There exists a wide variation in the status of teachers and the need for teachers at different levels of school education across the country.

The NCF2005 demands a teacher to be a facilitator of children's learning in a manner that helps children to construct knowledge and meaning. The teacher in this process is a co-constructor of knowledge. It also opens out possibilities for the teacher to participate in the construction of syllabi, textbooks and teaching-learning materials. Such roles demand that teachers be equipped with an adequate understanding of curriculum, subject-content and pedagogy. There is now a public acknowledgement that the current system of schooling imposes tremendous burden on our children.

This burden arises from an incoherent curriculum structure that is often dissociated from the personal and social milieu of children as also from the inadequate preparation of teachers who are unable to make connections with children and respond to

their needs in imaginative ways. Teachers need to be creators of knowledge and thinking professionals. They need to be empowered to recognize and value what children learn from their home, social and cultural environment and to create opportunities for children to discover, learn and develop. The recommendations of the NCF 2005on school curriculum are built on this plank.

1.12 Need and Significance of the Study

Training to student teachers and teacher educators for teaching with Constructivist approval has been main achievement of this work.

- School syllabi and text books are changed according to constructivist approach.
- Thrust area Constructivism is identified in XI Five Year Plan.
- No change in the present structure of Pre Service Teacher Education with respect to NCF 2005 and Constructivism.
- The product of this project will be in the form of computer multimedia.

  It can be used for providing training of teaching with Constructivist approach in-

  a) D. Ed. Courses, B. Ed. Courses, M. Ed. Courses

  b) Complimentary and Supplementary Training Package in In Service Teacher Education.
- Equipping Teachers at all levels for using constructivist learning-teaching in actual
- Computer Multimedia Training Package will be developed firstly through this study which can be used at all levels of Teacher education.
- Secondly, in addition to Traditional Teacher Education Programme this package can be used as a Component of Pre-service and In-service Teacher education.

1.13 Statement of the Research Problem

Development of Computer Multimedia Package for Enabling Teacher-Educators and Student-Teachers for Constructivist Classroom

1.14 Objectives of the Study

1. To identify the abilities essentially to be developed among student-teachers for using constructivism in teaching-learning process.
2. To develop the Computer Multimedia Package for using constructivism in classroom.

This 2nd major objective is analyzed in the following procedural step wise objectives. :

   i. To prepare theoretical and pedagogical foundation of constructivism.
   ii. To prepare planning guide for teaching at secondary school level based on constructive approach. (Teaching strategies, Learning Environment)
   iii. To prepare training package for organizing collaborative learning-teaching activities in classroom for knowledge construction. (Pair, Share, Discussion etc.)
   iv. To prepare strategies for constructivist evaluation.

3. To provide training to teacher educators for Questioning.
4. To find out effectiveness of Computer Multimedia for Constructivist Teaching.

1.15 Definition of Terms

Development

The act of defining, developing, evaluating and reconstructing the prepared Computer Multimedia and finding its usefulness, effectiveness with respect to enabling Teacher-Educators and student-teachers for Constructivist Classroom.; is development Computer Multimedia for this present study.

Computer Multimedia Package

It is a self contained component and convergence of text, pictures, PowerPoint slides, video and sound into a single form related to Constructivist approach. It includes

Module No.1 Constructivism – Concept and Meaning.

Module No.2 Structure and functions of Human Brain.

Module No.3 Brain based Learning

Module No.4 Psychological Perspectives of Constructivist Learning

Module No. 5 Cooperative Learning

Module No. 6 Planning for teaching for Constructivist Learning

Module No. 7 Experts views on Constructivism

Module No. 8 Language Lesson

Module No. 9 History Lesson

Module No. 10 Science Lesson

Module No. 11 Real Classroom Situations

Teacher-Educators

Personnel in College of Education who provide instruction or supervision of clinical experiences of prospective teachers from B. Ed. College which is from Satara district and Kolhapur district, affiliated to Shivaji University Kolhapur.

Student-Teachers

Students who are learning to teach and have undertaken one year B. Ed. course in the College of Education affiliated to Shivaji University, Kolhapur (Maharashtra) and who are admitted for academic year 2011-12 for Marathi, Science and History subject as the teaching methodology.

1.16 Delimitations

1. The study is limited to one B. Ed. colleges which are from Satara district and Kolhapur district affiliated to Shivaji University Kolhapur.
2. The study is limited to those B. Ed .student teacher admitted in academic year 2011-12.
3. The study is limited to student teachers having Marathi, History and Science methodology.