

## Study of Learners in a Constructivist Learning Environment

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### ABSTRACT

Man is a social animal not only a biological one. Education is preparing a child for the future so that the child lives effectively in the contemporary society. The society that we live in is not static but is constantly changing and evolving. Similarly, the education system must not be static but needs to change in order to meet the increasing demands of the society. In other words, the traditional system of education can no more meet the demands of the today's world which is full of complexities due to various arising problems. The ultimate goal of human life is to live in the society as a responsible and independent social individual. Education helps in shaping and molding human behavior and potentials that will enable them to become effective and efficient members of the society where they live in.

The society is changing as the demands are increasing; on the similar basis education should also change in order to meet the changing society. Traditional method of education cannot help in solving the present problems; hence, the evolution of education is also equally important so that the individuals can take their place in society as effective learners, as effective professionals and as effective citizens. There is often a mismatch between what students acquire in the classroom and the demands placed on them outside the school world. An education system should be such which involves learning skills that a person will carry with them even after school or college in order to navigate relationships and careers and be a well-rounded, successful person. Life skills are in existence from the period when man started living in the society, but there were only a handful of them with such skills. As the time evolved and societies began to expand the problems started increasing, thus people started developing skills required to solve them and this is how the number of persons with life skills increased and the quality of the skill of the people improved over a period of time.

The new millennium is ushered by dramatic technological revolution. In a society where most of work is now computer-oriented, how can schools resist the change. Technologies like smart classrooms, electronic networks are slowly infiltrating the schools. This technological revolution has transited the society from oral & print to visual culture. India, an agricultural country, beginning with agrarian society, got transformed to industrial society with times and with the rise of ICT, gave birth to information society of which knowledge is the primary source thus building a platform for knowledge society to retain which is the responsibility of education by generating knowledgeable and learned future learners. Even Vision 2020, defines Knowledge Society as a society where caring, sharing and using knowledge are key factors promoting prosperity and wellbeing of the people.

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### 1. Introduction

Man is a social animal not only a biological one. Education is preparing a child for the future so that the child lives effectively in the contemporary society. The society that we live in is not static but is constantly changing and evolving. Similarly, the education system must not be static but needs to change in order to meet the increasing demands of the society. In other words, the traditional system of education can no more meet the demands of the today's world which is full of complexities due to various arising problems. The ultimate goal of human life is to live in the society as a responsible and independent social individual. Education helps in shaping and moulding human behaviour and potentials that will enable them to become effective and efficient members of the society where they live in.

Present evaluation system in India comes under criticism because of number of reasons. The major emphasis of our

education system is Examinations. Educated as well as uneducated parents, have the belief that what really matters in education is the score one gets in the final examination. Percentage of marks in the board examinations is the most important criteria for being called for an interview for admission to a higher-level course or for getting a job. Sustained efforts of learners for so many years evaluated by the examiners in a short span of time. This raises a question mark on the entire system of examination because it does not take into cognizance the work done throughout the years in terms of projects, assignments, tests and class work, etc. It is associated with lot of stress and anxiety and sometimes leading to suicidal tendency and nervous breakdowns. The quality of question studies in the examination is very low. They are mostly test textbook based knowledge. A child is told repeatedly that the performance in the examination matters a lot as soon as the child starts schooling. Teacher and the parents constantly reinforce the fear of examination.

The term 'Knowledge society', 'Information Society' and 'Learning Society' have now become familiar expressions in the educational parlance, words that are pregnant with unimaginable potentialities. Knowledge should not remain the monopoly of few. If knowledge society is to develop properly then information delivery should not just be dispensing of information but information should be structured in such a way that it fulfils some basic conditions of inter-activity, mobility, convertibility, connectivity, ubiquity and globalization, as given by Toffler (1990). Psychological well-being refers to how people evaluate their lives; these evaluations could be in the form of cognitions or in the form of affect. Psychological well-being leads to desirable outcomes and it is important for the individual to be psychologically fit. Current social indicators capture phenomena such as environmental problems, crime, and gender inequality, divorce infant mortality, etc. These social indicators affect the students' psychological well-being; thus, our education system should be such that it prepares the students to face these with ease and in a positive manner irrespective of the circumstances that they are facing. Life skills education program will enable the students to develop such potentials that will help them to move with the flow of the society even beyond school. Critical thinking is a term that is given much discussion without much action. Critical thinking enables the students to become active thinkers of the society not only for their personal and professional problems but also for the problems that the youth is facing. Critical thinking is a higher order thinking skill which is not focused on, and the need to have better scores on assessments is just one of them. The critical thinking process prevents the mind from jumping directly to conclusions, rather it guides the mind through logical and systematic steps that tend to widen the range of perspectives and opinions, accept findings and results, put aside personal biases and consider reasonable possibilities. Life, skills education program can help in promoting higher order thinking among students within the school system which plays an essential tool of inquiry.

They need to develop a culture of inquiry, where students don't compete with each other for grades, but rather develop cooperative social structure and work towards the problem. Strommen & Lincoln 1992 p. found that Constructivism has led to the additional discovery that powerful gains are made when children work together. Children are able to reflect on and elaborate not just their own ideas but those of their peers as well. Children come to view their peers not as competitors but as resources. Gone are the days of notion "child is tabula rasa". Today's kid is not just a kid but ikid- intelligent, informative & innovative. In this digital age, children are not referred as students but digital natives and so to meet the needs and requirements of these 21<sup>st</sup> century kids, teachers should act as digital immigrants and techno-saves. For 21<sup>st</sup> century kids who are "always on", education needs a shift from didactic view to constructivist view for knowledge explosion. Although constructivism began as a theory of learning, it has progressively expanded its dominion, becoming a theory of teaching, a theory of education, a theory of the origin of ideas, and a theory of both personal knowledge and scientific knowledge.

Petraglia (1998) claims that in a constructivist environment the best hope for the educator is in the possibility of intervening in the learning that is occurring, rather than being in charge of the act of learning. Teachers need to come out of the frame of "instructor" to a "facilitator and digital immigrant". Otherwise, in the near future, the fate of teachers will be "teacher in the class with no student". Nowadays, 'Technology is no longer a luxury'. Students are used to fast paced, multi-sensory, highly interactive technologies all around them. They are now used to processing and evaluating data in even less than 30 second what they supposed to acquire in one-hour lecture. Constructivists recognize the fact that learners require opportunities to assimilate new information in repetitive and multiple ways. Petraglia (1998) asserts that computers can serve as coaches by locating the problem and allowing for as much rehearsal, practice and help as necessary to accomplish the task. Jonassen & Reeves (1996) determined that the use of computers can enhance cognitive powers of students during thinking, problem solving and learning. Yet within educational institutions, the amount, quality and expertise in technology is grossly insufficient. In order to capitalize upon "life in the real world", we must integrate technology in classrooms. If education is to be pertinent, productive, progressive and proficient then the fever of technology can no longer be starved, but must be fed, embraced and embodied within our institutions; making every attempt to fuel it rather than cool it.

According to Lorenzo and Ittelson (2005a) students creating an e-portfolio are involved in: strategic planning; the acquisition and analysis of information; processing and connection making; synthesis as they bring ideas and artifacts together, as well as designing the look and layout of their portfolio; and evaluation and self-reflection. This characteristic is particularly appropriate to support the learning theories of constructivism, assuming that learning is best accomplished by engaging students in constructing knowledge themselves.

Constructivism does not refer to a specific pedagogy, although it is often confused with constructionism, an educational theory developed by S.Ppaert, inspired by constructivist and learning ideas of Piaget.

Piaget's theory of constructivist learning has had wide-ranging impact on learning theories and teaching methods in education and is an underlying theme of many educational movements. Research support for constructivist teaching techniques has been mixed, with some research supporting these techniques and other research contradicting those results.

Human beings are the unique product of their creation and evolution in contrast to other forms of animal life their more highly developed nervous system has enabled them to develop sound and symbols letters and numbers that make possible the communication and recording of their questions observations experiences and ideas. The teaching and learning of education are a complex activity and many factors determine the success of this activity. The nature and quality of instructional material, the presentation of content, the pedagogic skills of the teacher, the learning environment, and the motivation of the students are all important and must be kept in view in any effort to

ensure quality in teaching learning.

Education in its broadest sense presupposes a better understanding of teaching and learning. On one side, teachers are supposed to be able to impart their knowledge through the many approaches, methods and techniques at their disposal. Teaching, for instance, requires a basic skill in explaining abstract concepts. Abstract thinking is one of the skills to be introduced to students at an early stage of learning this science. In India, however, studies have often been cited as a "monster" that troubles the students' progress in learning for a higher level of education. On the other, students particularly those who will continue their studies to a tertiary level are confronted with the various problems of life. They lack books, especially the translated texts, and other learning aids. Unlike in advanced countries, the students in India entirely depend on the explanation given by their teachers. This is especially true of learning as the basic science to further their studies.

In reality, there is a big chasm between teachers and students. Teachers believe that they can produce a change of behavior, as is defined in the process of learning, after explaining everything about complex concepts. Students, on the other hand, feel that they have not learned enough from their teachers. As a result, there is a kind of "tug of war" between the two parties. The question is which party should be given more treatment, the teachers or the students.

For the feasible purposes, teachers should be given more training and knowledge on how to teach. Part of the solution is that the teachers should change their perception about their students. Students are no longer "containers to be filled", instead they are curious people with much potential to learn anything new. What is needed today is the cooperation between teachers and students in finding solutions to the problems of teaching and learning. Both parties must realize the importance of sharing and exchanging experiences. Teaching must be very interesting that can help the students solve the many problems they face. Teachers can no longer boast of their overt knowledge. Students can be expected to contribute to the understanding of this science. The old saying "a teacher knows better" is no longer applicable.

### 1.1 Definitions of Innovation

A review of the literature on innovation yields multiple definitions, components, and processes that attempt to distinguish a unique element. Characteristic to all definitions are proximal, distal, and confluent properties of innovation. The proximal properties include definitions that conjoin to individual or micro perceptions of innovation, versus distal properties that ascribe a community, or macro, perception of innovation. Thus, it can be argued that if an individual learns or performs a task for the first time it may be considered innovative. This also includes tasks that may have been available to the individual yet unperformed. The distal element underscores the value of the perceived task within a community or other external validating entity. Additionally, the confluence of the proximal and distal categories of innovation highlights a dynamic synergy for both personal and public innovations.

Foremost in any treatise of innovation is the foundational lexicon or definition that anchors subsequent substantive discussions. Clapham (2003) states that "the word innovate comes from the Latin word 'innovare' which means to renew, to make new" (p. 366). Therefore, by definition, an innovation can be a renovation of a theme or a variation of an idea. The author further cites Smith (2003) who postulates that a critical component of innovation is "ideation." The notion of ideation suggests credibility to best practice research that in fact is grounded not only on ideation but also on data-based implementation. This resonates with Kostoff (2003) who suggests that "innovation reflects the metamorphosis from present practice to some new, hopefully, 'better' practice" (p. 388). Sternberg, Pretz, and Kaufman (2003) define innovation as "the channeling of creativity so as to produce a creative idea and/or product that can and wish to be used" (p. 158). Thus, an innovation may have only intrinsic value. Consequently, teachers as action researchers can discover innovative curricular, instructional, and management strategies that will effectively benefit their respective classes and may be transported to colleagues.

### 1.2 Proximal Innovation

Rogers (1995) defines innovation in terms of its proximal, distal, and interactive associations by stating that things, ideas, or practices are perceived to be new or novel by an individual or other external entity. The onus of determining innovativeness falls to the individual perceiver as well as to the entity intending to embrace the innovation - the unit of adoption - as having deemed value to the innovation. This provides for an internal or proximal association to the perceiver. Rogers goes on to state it is of little consequence whether or not an idea is, in fact, new since its first use or discovery over time. The external or distal objectivity allows for validation of the innovation for the individual purpose. Rogers concludes by suggesting that individualization of perception regarding "newness" will determine the individual's reaction. Hence, there is a dynamic interaction between the internal perception and affirmation of the innovation, and the external validation and the consequent reaction - thus setting into motion perhaps yet another innovation. This circular pattern of perception, internalization, reaction, action, and perception seems to provide a template for the process of initiating innovation. In fact, Kostoff (2003) resonates with Boyer (1997) when he states that innovation is characterized as "discovery of previously unknown information, discovery and synthesis of publicly available knowledge whose independent segments have not been combined and/or invented" (p. 388). Boyer's counterparts to Kostoff's categories include the scholarship of discovery and the scholarship of integration. Boyer states "knowledge is acquired through research, through synthesis, through practice and through teaching" (p. 24). Hence, this progression from research to teaching exemplifies the connectivity of innovation and the need for assessment of its outcomes.

### 1.3 Distal Innovation

Shavinina (2003) suggests that innovation and discoveries are central to human culture, echoing of collaborative definition of innovation advanced by Hauschildt (2003), who posits, "the success of innovation is to a great extent dependent upon the

activities and abilities of individuals who enthusiastically support the new product or process” (p. 804). Hauschildt referred to these individuals as champions and promoters.

Parallels to teacher education can be easily drawn. First, innovation and discovery are embedded in the teaching and learning process in the culture of education. Second, both the teachers and students actively and intimately engage in collaboration with the curricula that address standards. Third, as champions and promoters, school administrators and parents advance the efforts of the teachers as they conduct action research and implement data-driven instruction in their classes to create instructional innovation.

#### 1.4 Proximal and Distal Confluence

A 20th century innovator (inventor of the geodesic dome, for example), R. Buckminster Fuller (1981), described innovations in various industries such as ship building, architecture, and copper mining. He noticed that when half of the industries in a specific area have adopted an innovation, it stops being an innovation and enters a new phase. His notion is based on the distinctions between new practice and accepted practice wherein the majority of an industry is using that method. Thus, an innovation would have to be anything that hasn't reached 50% industry penetration. Generalizing this definition to teacher education, an innovative practice in teacher education would remain an innovation until at least half of the industry has adopted the innovation. In other words, if we make a distinction between teacher education researchers' standard practices and teacher education implementers' standard practices, half of the researchers in teacher education would need to adopt the innovation and half of the implementers would have to adopt it before it would enter the next phase of accepted or standard practice where the majority of the industry has adopted the method. For public school innovations, similarly: half of the schools must adopt it. Within a specific school, half of the faculty and staff would have to adopt it.

Admittedly, this definition is daunting, but it could provide a framework to explain differences of opinion about various innovations. Consider constructivist pedagogical approaches. If you are a teacher education researcher, for example, you may have the experience that 50% of the researcher colleagues whom you know have adopted the practices of constructivist research. In comparison, other colleagues might be teacher educators who use constructivist practices and notice that less than 50% of their school of education faculty do NOT practice this method of teacher education research. Nor is it being implemented by 50% of the faculty in the local area public schools. Thus, in their experience, constructivism remains an innovation.

## 2. Review of Literature

According to Glasersfeld (1995), each individual construct meaning, knowledge and conceptual structures differently. So, the teachers should be cognizant that students may view curricula, textbooks differently than they do. Accordingly, teachers should not attempt to transfer conceptual knowledge to students through words. Instead, they should be concerned

with how learners understand the process of knowing and how they justify their beliefs. If the constructivism provides the learners with lots of opportunities to make meaning, the assessment should also be made by the learners themselves. Through self-assessment, each learner can assess his or her process of meaning making.

Guba and Lincoln (1989) says that all the stakeholders have their rights to evaluate the learners as an evaluator cannot stand outside the learning process. Hence, all the stakeholders of the learning process such as, self, peers, teachers, parents, school administrators as well as parents should collaboratively assess the child through project work, seminar presentation, group performances, etc. They will share ideas which will be helpful to the learners towards reconstruction of knowledge and improving their assignments. Through collaborative assessment, they will come to a consensus of how they could interpret, look or observe the process of knowledge construction by the child.

Mohamed S. Al-moamary (2012) “Assessment steers students' learning” is a statement that has been used repeatedly without solid evidence in the literature. This manuscript aims to evaluate the published literatures on the effect of teaching learning environment in particular, the implemented assessment on students' learning approaches. A literature review was performed on the effect of assessment on students learning approaches. English language literatures were searched in Pub med, PsycINFO, and Medline without restriction to type or date of publication. Reviewing the literature, the most prominent identified theme was assessment function characterized in summative and formative assessment and general effect of assessment on students' learning approaches. The literature review has pointed clearly to the complexity of the relationship between learning environment, students' perceptions of assessment demands, and students' approaches to learning. Many factors (extrinsic and intrinsic) were theoretically proposed to mediate students' approaches to learning in response to their assessment. However, few of these factors were researched in the published literature. Formative assessment is likely to contribute to students' deep approach to learning while summative is likely to contribute to their surface approach. However, these effects are not definite and further research about the complex relationship between assessment and students' learning is required.

Mehmet Fatih Ayaz (2015) in this research, a meta-analysis study was conducted in order to determine the effects of constructivist learning approach on students' academic achievement. Master's thesis, doctoral dissertation and studies in national and international databases, which are realized between the years of 2003–2014, appropriate to the problem and which can be included in a work of meta-analysis with important statistical data, have been studied by scanning in Turkish and English. At the end of the literature review, a total of 53 studies about effects of constructivist learning approach on student's academic achievement have been included in the meta-analysis study. Meta-analysis study determined that the constructivist learning approach, compared to traditional teaching methods, has positive effects on the student's academic achievement. After using a random effects model

with a 0.910 and 1.402 interval of the confidence, the overall effect of constructivist learning approach in relation to academic achievement of students is found 1.156 (95% CI, SE=0.125). 50 of the 53 studies included in the study have positive results, though only 3 of them show negative effect. As a result of moderator analyzes, we see that the highest effect values are observed in the master's thesis, in the teaching of science and at the college level.

Mustafa Koc (2015) this review will explore the influences of technology integration into pre-service teacher education programs from the constructivist and behaviourist perspectives for the ultimate aim of improving student learning and pre-service teacher training. A wide range of research is cited, including research studies, books, comparison studies, case studies, government records, dissertations and web sites. The study concludes that technology integration representing learning from technology (behaviourist perspective) is not the most effective way to improve learning although it helps learners to perform the lower level sub skills automatically. On the other hand, constructivist-learning environments representing learning with technology, which encourages learners to actively process and organize information by making internal cognitive connections, can well provide the theoretical framework for the effective technology integration.

Botvin and Kantor (2000) in their study stated that rates of drinking and smoking increase among high school students as they age. Therefore, prevention programs that target youth either before or during junior high school may help prevent alcohol, tobacco, and other drug (ATOD) use during high school. Life skills training (LST) is a school-based approach designed to prevent ATOD use among youth by influencing their knowledge and attitudes about ATODs, by teaching skills for resisting social pressures to use ATODs, and by helping students develop personal self-management and social skills. Researchers have studied this program's effectiveness in preventing use of various substances among varied populations.

Life Skills Education in South Africa and Botswana (2000) in their report describes and provides an evaluation of a program of Life Skills Education for all seven grades of selected primary schools in South Africa and Botswana, during the period from 1996-1999. The development and implementation of the program was sponsored by the International Center for Alcohol Policies<sup>1</sup> (ICAP), Washington DC with technical support from the Program on Mental Health at WHO. The evaluation was funded by ICAP and carried out by two consultants (MrJ.Lee and DrJ.Orley) with extensive experience in this field. The aim was to provide a context in which the required materials could be developed, the training refined and any problems with implementation solved. The desired outcome was to have a set of materials and a described method for implementing the program, which could be made available to any group who wished to do so. Life Skills Education (LSE) has been introduced into the teaching programs of both primary and secondary schools over the last 20 years or more. This has been done mainly in developed countries has been seen as a way of providing a context for promoting healthy lifestyles in children, which it was hoped

would continue into adulthood. Rather than providing health education by pointing out the dangers of certain behaviors, LSE introduces children to a number of skills such as decision-making skills, communication skills and how to handle emotions. These skills should help them to choose a healthy lifestyle.

Nair (2005) reported that adolescence is a period of experimenting, experiencing and expanding. Adolescents need help and guidance in decision-making, problem solving, critical thinking, developing interpersonal skills, self-awareness, empathy, coping with stress and managing emotions. The rebelliousness and dislike for parental intrusion usually keeps parents at bay because teenagers do not relish the idea of help and guidance from parents. However, this may not always be so. Beneath frequent violent outbursts, sudden mood swings and related interpersonal problems of an adolescent, there may be a person crying out for professional help. All adolescents need support and guidance. When parents find it difficult to handle signs of trouble, professional help should be sought at the earliest. Extra care is needed while offering help to adolescents problems because it is not easy for teenagers to accept the fact that they need help. Attempts should be made to understand the adolescent, and to safeguard, protect and guide him/her. The Family Life & Life Skills Education Program is a good support system for adolescents at the community level.

Yadav and Iqbal (2009) in their study aimed to see the impact of life skill training on self-esteem, adjustment and empathy among adolescents. Total sample comprised of 60 students (30 males and 30 females) from the Hans Raj Model School, Punjabi Bagh who has received life skill training from the team of Expressions India. Self-esteem inventory (school form), Adjustment inventory for school students (AISS) and the Empathy quotient (EQ) were administered in a group session one by one in two or three days both before training was given and after training. In the post condition, test scores were obtained after 5 months of training. The result showed that subjects improved significantly in post condition on self-esteem, emotional adjustment, educational adjustment, total adjustment and empathy. However, no significant difference was found on social adjustment in pre and post condition. Overall training was very effective as subjects improved in the post condition on all measures except one, thus showing that Life skill training do show positive result in bringing change in adolescent's attitude, thought and behavior by providing supportive environment to them.

Carmichael and Farrell (2012), state a graduate's ability to be a critical thinker is expected by many employers; therefore development of students' critical-thinking skills in higher education is important. There is also a perception that today's students are technologically "savvy", and appreciate the inclusion of a technological approach to learning. However, the complexity of the concept of critical thinking and the assumptions about students' technological skills are debatable issues that require clarification and evidence-based research in terms of teaching and learning. This study reports on a case study of an online Blackboard site at the University of Western Sydney, where analysis of patterns of usage of the online site

and qualitative analysis of student feedback provide evidence to support its effectiveness for encouraging students' critical thinking. There is potential to expand this into a more widely usable teaching and learning resource in the future, and for further research to explore the benefits for student learning.

Sharma (2013), conducted the present research with the objectives to compare Critical Thinking with reference to level of education (standard), gender and habitat of Students of Secondary School, to compare Critical Thinking with reference to level of education (standard), gender and habitat of Students of Secondary School, to find the correlation between the different group of Students of Secondary schools with reference to Critical gender and total sample. The Independent Variables were Gender (male/Female), Habitat (Rural/Urban) and Dependent Variables were Critical Thinking, Critical Thinking and Academic Achievement. The present research study was conducted taking sample of students from secondary; from Grant-in-aid school of Mehsana City. The present research was Descriptive Survey by its nature. Population and Sample of the Study: The population of the study was the students from secondary; from Secondary schools of Mehsana city. The sample for the study was selected by using random sampling method. In the present investigation survey method was employed. To collect the data for the present investigation Critical Thinking Test (Prepared by Investigator) was used. Data for the present research was collected by the investigator. Statistical Treatment: For the calculation of the data, the researcher had employed the formulas of Mean, Standard Deviation, and t-value. From the above research study it is found that there is not any significant effect of gender and habitat on Critical Thinking of Secondary students. Group of Higher secondary school students are found significantly higher than the group Secondary school students. It means growing age of the person is related with the perception towards the Critical Thinking. It has been also found that there is positive correlation found between Critical Thinking and Academic Achievement of total students of secondary students. It is evident that Academic Achievement of school student is related with Critical Thinking of students.

Dr. Liker Cirik (2014) In this research, ninth grade mathematics learning environments' coherence with constructivist learning approach was examined according to teachers' and students' views. Thirty-four schools were included into the sampling from the seven regions of Turkey. 208 teachers and 1830 students from these schools participated to the study. Data was collected with "Constructivist Learning Environments Questionnaire" and "Learning Process Questionnaire". The one-way ANOVA, Welch and independent samples t-test was employed to analyze data. According to results of the study there is no significant difference between teachers' and students' views  $p > .05$ . Students' views, on the other hand, are significantly different according to deep learning levels  $p < .05$  but between surface approach levels there is no significant difference  $p > .05$ . In addition, teachers' views do not differ significantly according to teaching experience and educational level  $p > .05$ . Based on these results, it can be concluded that developments in our education system started a positive change in classroom implementations.

## 2.1 Taxonomies of Innovation

The literature is replete with components, types, and elements of innovation. The various categories further advance the notion that innovation is subjective to internal and external validation. Sternberg, Pretz, and Kaufman (2003) suggest eight types of innovations based on Sternberg's propulsion model of creative innovations. The eight types of innovations include "replication, redefinition, forward incrimination, advance forward incrimination, redirection, reconstruction, re-initiation and integration" (p. 159). Teacher education innovations presented in this issue reflect this taxonomy. For example, innovation through integration can be seen in this issue in Teemant's application of socio-cultural theory to a bilingual distance education program. The innovation of reconstruction is highlighted in this issue by Whittaker, McDonald, and Markowitz, who reconstruct multicultural pedagogy to create new ways of providing instruction. In this issue the innovation of advance forward incrimination is evidenced in Sindelar, Bishop, Brownell, Rosenberg, and Connelly wherein special education teacher preparation is examined and projected in successive studies to provide viable and defensible avenues for future research.

In contrast, Robertson (1971) suggests three types of innovation: continuous innovation, dynamic innovation, and discontinuous. Continuous innovation in teacher education would include program revisions based on student outcomes assessment as recommended in this issue by Hall, Nowinski, and Smith and by Sindelar, Bishop, Brownell, Rosenberg, and Connelly and as practiced by Wong and Glass as well as Karayan and Gathercoal. Dynamic innovation is exemplified by data-based triangulation of assessments gathered from students, instructors, and field-based constituents for the purpose of program development and/or modification such as the research reported in this issue by Donnell and Harper as well as Wong and Glass. Finally, discontinuous innovation supports individual faculty efforts, perhaps through program improvement grants to produce innovation for a specific area, such as the study in this issue by McClintock, O'Brien, and Jiang in mathematics education. Moreover, the taxonomy of innovations in teacher education featured in this issue include collaborative partnerships (Sindelar et al.; Teemant; Wong & Glass; McClintock et al); professional development schools (Wong & Glass); integration of technology (Karayan&Gathercoal; Teemant); standards-based teacher education (Hall, Nowinski, & Smith); data-based professional development (Teemant; Wong & Glass; Whittaker et al.); alternative certification (Sindelar et al); graduate follow-up programs (Whittaker et al); teacher recruitment and induction (Wong & Glass). In addition, the topic of teacher education reform and accountability is addressed by all authors.

## 2.2 Constructivist Learning Environment

In a constructivist learning environment learning occurs when a learner actively constructs a knowledge representation in working memory. Here, the learner is a sense maker, whereas the teacher is a cognitive guide or facilitator who provides guidance and modeling on authentic academic tasks. The teacher's role is to create environments in which the learner interacts meaningfully with academic material, including

fostering the learner's processes of selecting, organizing and integrating information. Some of the basic assumptions of constructivist learning which could be applicable towards generating a constructivist learning environment are:

1. Subjective reality of the learner is actively constructed through the interaction between the individual and his/her real-world environment. Knowledge is to be seen as dynamic and ever changing with experiences.
2. Learning is a process for acquiring information and processing experience, in which the learner selects and constructs knowledge that is useful and appropriate for him/herself and in turn uses this to drive and determine his/her own continuous learning process.
3. Learning should involve social negotiation and mediation.
4. Content and skills should be made relevant to the learner. It should be understood within the framework of the learner's prior knowledge. The learner perceives, selects and integrates new information and experience into his/her current knowledge base, thereby changing it.
5. Students should be assessed formatively serving to inform future learning experiences.
6. Students should be encouraged to become self-regulatory, self-mediated and self-aware.
7. Teachers serve primarily as guides and facilitators of learning, not instructors. He coaches, moderates, suggests, but allows the students to experiment, ask questions, try things that don't work and reflect.

These can also be the guiding principles for the student assessment in a constructivist learning environment.

### 2.3 Transfer of Learning

Transfer of learning is the application of skill, knowledge or understanding to resolve a novel problem or situation that happens when certain conditions are fulfilled. Research indicates that learning transfer is infrequent; most common when "cued, primed, and guided and has sought to clarify what it is, and how it might be promoted through instruction.

A significant and long research history has also attempted to explicate the conditions under which transfer of learning might occur. Early research by Ruger, for example, found that the "level of attention", "attitudes", "method of attack" (or method for tackling a problem), a "search for new points of view", "a careful testing of hypothesis" and "generalization" were all valuable approaches for promoting transfer. To encourage transfer through teaching, Perkins and Salomon recommend aligning ("hugging") instruction with practice and assessment, and "bridging", or encouraging learners to reflect on past experiences or make connections between prior knowledge and current content. In a changing environment, an animal must constantly gain new information to survive. However, in a stable environment, this same individual needs to gather the information it needs once, and then rely on it for the rest of its life. Therefore, different scenarios better suit either learning or innate knowledge. Essentially, the cost of obtaining certain knowledge versus the benefit of already

having it determines whether an animal evolved to learn in a given situation, or whether it innately knew the information. If the cost of gaining the knowledge outweighs the benefit of having it, then the animal does not evolve to learn in this scenario-but instead, non-learning evolves. However, if the benefit of having certain information outweighs the cost of obtaining it, then the animal is far more likely to evolve to have to learn this information.

### 2.4 Assessment of Learners

What kind of assessment is needed in the constructivist classrooms environment? How the quality of the ideas constructed by the learners will be judged? Who will judge the quality of the ideas constructed by the learners? Unlike the prevailing system of evaluation, constructivism provides the learners with lots of opportunities to construct knowledge and make meaning, the assessment also should be made in such way that the learners will construct new understanding and acquire new skills. Constructivists believe that assessment should be used as a tool to enhance both the students' learning and the teachers' understanding of the students' current understanding. It should not be used as an accountability tool that makes some students feel good about themselves and causes others to develop a low self-concept. Some of the basic assumptions of assessment of learners in a constructivist learning environment are:

1. Assessments are in a meaningful context that is relevant or has emerging relevance to students (Brooks and Brooks, 1993).
2. The process of learning does not shut down during assessment (Brooks and Brooks, 1993). Learners who have been engaged to construct new knowledge are expected to learn more during assessment.
3. Assessments include higher order thinking skills, i.e., application, evaluation, analysis, synthesis (Bury-Stock, 1995; Yager, 1991).
4. Assessments include application of knowledge and comprehension (Zahorik, 1995).
5. A range of techniques is used in assessments (Bury-Stock, 1995; Zahorik, 1995).
6. Assessments focus on the big pictures on concepts and on issues and their accompanying facts and evidence (Zahorik, 1995).
7. Assessment includes inquiry (Brooks and Brooks, 1993; Yager, 1991; Zahorik, 1995).
8. Students interact with each other in all circumstances including during assessments (Zahorik, 1995).

### 2.5 Learning Can Be Improve Through Assessment

The Assessment Reform Group (1999, p4-5) sum up Black and Wiliam's (1998) research in their study beyond the black box suggested that improving learning through formative assessment depends on 5 key factors:

1. Effective feedback to pupils:  
A written feedback technique I have observed in school is 'pinking and greening' and is useful for written pieces of work. You highlight something they have done well in pink (which stands for 'practically

perfect') with a comment about why it was exemplary and highlight something in green (for 'growth') which they could improve, again providing a comment on how they could improve this next time.

2. Pupils' active involvement in their own learning:  
An aspect of students taking an active part in their own learning might be to have a self-awareness of how they learn and their attitude to learning. An awareness of what learning feels like (making mistakes, the 'learning pit' etc.) and their feelings towards their own learning abilities can affect their motivation and self-esteem which in turn has an effect on their learning day-to-day.
3. Adjusting teaching to take account of the results of the assessment:  
Some ways you could assess understanding during the lesson is to use 'fingers of confidence' where children close their eyes and show on one hand how confident they feel about the lesson task or what they have learned (0- not confident 5- very confident). Another way would be to use thumbs up for 'I understand' sideways thumb for 'I'm not sure' and thumbs down for 'I don't understand'. Other strategies for creating assessment opportunities within lesson can be found here.
4. Recognition of the effect assessment has on the motivation and self-esteem of the pupils (both are crucial influences in learning, see Clarke 2001, chp 8).
5. The need for pupils to be able to assess themselves and understand how to improve.  
The belief underlying this conception of assessment is that the data measured can be used to report the extent or level of a pupil's learning. The measurement can be achieved through testing, observation, informal chat, portfolio collection or self /peer assessment and the results are used to improve pupil's performance. In this way, the assessment is viewed as external to the learning. Learning can be understood as a hierarchy of attainment which pupils work their way up or a linear track on which pupils 'move forward' by performing tasks that show they have gained enough knowledge to move to the next level. This is implicit in the national curriculum through its levels and corresponding assessments for reading, writing and maths.
6. In the above context, broadly, there could be two ways in which learners can be assessed in a constructivist learning environment. They are:

#### a. Content Assessment

This involves how well learners are students are able to function within a content domain, and whether they could use the tools and understandings of the domain to solve problems within that domain. For example, if students are involved in an authentic task, then evaluation would assess whether they successfully completed that task or not.

#### b. Process Assessment

This involves how well students reflect on the processes whereby they came to their conclusions and document this process. According to Jonassen (1991), evaluating how learners go about constructing their knowledge is more important than the resulting product, suggesting that evaluative procedures must become an integral part of the instructional process. Jonassen also feels that goal free evaluation could be an important part of constructivist evaluation, since that would allow the evaluator to be unbiased by the goals of instruction. Students control their own learning process, and they lead the way by reflecting on their experiences.

#### Reflective learning

This process makes them experts of their own learning. The teacher helps create situations where the students feel safe questioning and reflecting on their own processes, either privately or in group discussions. The teacher should also create activities that lead the student to reflect on his or her prior knowledge and experiences. Talking about what was learned and how it was learned is really important.

Example: Students keep journals in a writing class where they record how they felt about the class projects, the visual and verbal reactions of others to the project, and how they felt their own writing had changed. Periodically the teacher reads these journals and holds a conference with the student where the two assess (1) what new knowledge the student has created, (2) how the student learns best, and (3) the learning environment and the teacher's role in it.

#### Constructive learning

Students are not blank slates upon which knowledge is etched. They come to learning situations with already formulated knowledge, ideas, and understandings. This previous knowledge is the raw material for the new knowledge they will create.

Example: An elementary school teacher presents a class problem to measure the length of the "Mayflower." Rather than starting the problem by introducing the ruler, the teacher allows students to reflect and to construct their own methods of measurement. One student offers the knowledge that a doctor said he is four feet tall. Another says she knows horses are measured in "hands." The students discuss these and other methods they have heard about and decide on one to apply to the problem.

#### Active learning

The student is the person who creates new understanding for him/herself. The teacher coach, moderates, suggests, but allows the students room to experiment, ask questions, try things that don't work. Learning activities require the students' full participation (like hands-on experiments). An important part of the learning process is that students reflect on, and talk about, their activities. Students also help set their own goals and means of assessment.

## 2.6 Collaborative Learning

The constructivist classroom relies heavily on collaboration among students. There are many reasons why collaboration contributes to learning. The main reason it is used so much in constructivism is that students learn about learning not only from themselves, but also from their peers. When students review and reflect on their learning processes together, they can pick up strategies and methods from one another. The effective integration of ICT in the school and classroom can both transform pedagogy and empower students. It is important that teachers are able to successfully weave technology into learning projects.

Level of familiarity with ICT will naturally differ among beginning teachers. This site is designed to help you learn at your own level and pace to further develop your competency and confidence in the use of ICT. Below are a number of real-world scenarios or tasks you may encounter in your day-to-day work as a teacher. By clicking on a task, you can access a range of tutorials and resources that will help you to further integrate ICT into your teaching and learning.

## 2.7 Evaluation

- judgment made on the basis of a student's performance

### Pre-Assessment

- assessment made to determine what a student does and does not know about a topic
- assessment made to determine a student's learning style or preferences
- used to determine how well a student can perform a certain set of skills related to a particular subject or group of subjects
- occurs at the beginning of a unit of study
- used to inform instruction: makes up the initial phase of assessment for learning

### Formative Assessment

- assessment made to determine a student's knowledge and skills, including learning gaps as they progress through a unit of study
- used to inform instruction and guide learning
- occurs during the course of a unit of study
- makes up the subsequent phase of assessment for learning

### Summative Assessment

1. assessment that is made at the end of a unit of study to determine the level of understanding the student has achieved
2. includes a mark or grade against an expected standard

### Assessment of Learning

Assessment of Learning is the assessment that becomes public and results in statements or symbols about how well students are learning. It often contributes to pivotal decisions that will affect students' futures. It is important, then, that the

underlying logic and measurement of assessment of learning be credible and defensible. Assessment for Learning happens during the learning, often more than once, rather than at the end. Students understand exactly what they are to learn, what is expected of them and are given feedback and advice on how to improve their work. Assessment for Learning Assessment for Learning "In Assessment for Learning, teachers use assessment as an investigable tool to find out as much as they can about what their students know and can do, and what confusions, preconceptions, or gaps they might have. The wide variety of information that teachers collect about students' learning processes provides the basis for determining what they need to do next to move student learning forward. It provides the basis for providing descriptive feedback for students and deciding on groupings, instructional strategies, and resources."

### Teachers' Roles in Assessment for Learning:

"Assessment for learning occurs throughout the learning process. It is interactive, with teachers: • aligning instruction

- identifying particular learning needs of students or groups
- selecting and adapting materials and resources
- creating differentiated teaching strategies and learning opportunities for helping individual students move forward in their learning
- Providing immediate feedback and direction to students. Teachers also use assessment for learning to enhance students' motivation and commitment to learning. When teachers commit to learning as the focus of assessment, they change the classroom culture to one of student success.

Through this process students are able to learn about themselves as learners and become aware of how they learn – become meta cognitive (knowledge of one's own thought processes). Students reflect on their work on a regular basis, usually through self and peer assessment and decide (often with the help of the teacher, particularly in the early stages) what their next learning will be. Assessment as learning helps students to take more responsibility for their own learning and monitoring future directions.

### Assessment as Learning

- What is the purpose of learning these concepts and skills?
- What do I know about this topic?
- What strategies do I know that will help me learn this?
- Am I understanding these concepts?
- What are the criteria for improving my work?
- Have I accomplished the goals I set for myself?

The teachers' role in promoting the development of independent learners through assessment as learning is to:

- model and teach the skills of self-assessment
- guide students in setting their own goals, and monitoring their progress toward them

- provide exemplars and models of good practice and quality work that reflect curriculum outcomes
- work with students to develop clear criteria of good practice Teachers' Roles in Assessment as Learning Teachers' Roles in Assessment as Learning
- guide students in developing internal feedback or self-monitoring mechanisms to validate and question their own thinking, and to become comfortable with ambiguity and uncertainty that is inevitable in learning anything new
- provide regular and challenging opportunities to practise, so that students can become confident, competent self-assessors
- monitor students' meta cognitive processes as well as their learning, and provide descriptive feedback
- Create an environment where it is safe for students to take chances and where support is readily available."

In classrooms where assessment for learning is practiced, students are encouraged to be more active in their learning and associated assessment. The ultimate purpose of assessment for learning is to create self-regulated learners who can leave school able and confident to continue learning throughout their lives. Teachers need to know at the outset of a unit of study where their students are in terms of their learning and then continually check on how they are progressing through strengthening the feedback they get from their learners. Students are guided on what they are expected to learn and what quality work looks like. The teacher will work with the student to understand and identify any gaps or misconceptions. As the unit progresses, the teacher and student work together to assess the student's knowledge, what she or he needs to learn to improve and extend this knowledge, and how the student can best get to that point. Assessment for learning occurs at all stages of the learning process.

Constructivism as a paradigm or worldview posits that learning is an active, constructive process. The learner is an information constructor. People actively construct or create their own subjective representations of objective reality. Social constructivism or socio-cultural encourage the learner or learners to arrive at his or her version of the truth, influenced by his or her background, culture or embedded worldview. Historical developments and symbol systems, such as language, logic, and mathematical systems, are inherited by the learner as a member of a particular culture and these are learned throughout the learner's life. This also stresses the importance of the nature of the learner's social interaction with knowledgeable members of the society. Without the social interaction with other more knowledgeable people, it is impossible to acquire social meaning of important symbol

systems and learn how to utilize them. Young children develop their thinking abilities by interacting with other children, adults and the physical world. From the social constructivist viewpoint, it is thus important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process.

Another crucial assumption regarding the nature of the learner concerns the level and source of motivation for learning. According to Von Glasersfeld (1989) sustaining motivation to learn is strongly dependent on the learner's confidence in his or her potential for learning. These feelings of competence and belief in potential to solve new problems are derived from first-hand experience of mastery of problems in the past and are much more powerful than any external acknowledgment and motivation. According to the social constructivist approach, instructors have to adapt to the role of facilitators and not teachers (Bauersfeld,1995). Whereas a teacher gives a didactic lecture that covers the subject matter, a facilitator helps the learner to get to his or her own understanding of the content. In the former scenario the learner plays a passive role and in the latter scenario the learner plays an active role in the learning process. The emphasis thus turns away from the instructor and the content, and towards the learner (Gamoran, Secada, &Marrett, 1998). This dramatic change of role implies that a facilitator needs to display a totally different set of skills than that of a teacher (Brownstein 2001). A teacher tells, a facilitator asks; a teacher lectures from the front, a facilitator supports from the back; a teacher gives answers according to a set curriculum, a facilitator provides guidelines and creates the environment for the learner to arrive at his or her own conclusions; a teacher mostly gives a monologue, a facilitator is in continuous dialogue with the learners (Rhodes and Bellamy, 1999). A facilitator should also be able to adapt the learning experience 'in mid-air' by taking the initiative to steer the learning experience to where the learners want to create value.

The learning environment should also be designed to support and challenge the learner's thinking (Di Vesta, 1987). While it is advocated to give the learner ownership of the problem and solution process, it is not the case that any activity or any solution is adequate. The critical goal is to support the learner in becoming an effective thinker. This can be achieved by assuming multiple roles, such as consultant and coach.

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