International Journal of Instruction *January 2013 ● Vol.6, No.1*
e-ISSN: 1308-1470 ● www.e-iji.net *p-ISSN: 1694-609X*

Effect of Teaching of Algebra through Social Constructivist Approach on 7th Graders' Learning Outcomes in Sindh (Pakistan)

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It is a bitter reality that the curricula and traditional pedagogy prevailing in public schools of Pakistan in general and Sindh in particular do not incorporate the algebraic concepts properly. Both the content and the presentation therein cannot be considered up to the mark, thereby making "Algebra" a tough and dry subject. This quasi-experimental study focused to find out the effect of teaching algebra through social constructivism on the students learning outcomes of 7th graders in public schools of District Jamshoro Sindh. For this purpose two existing in-tact sections of grade 7 (7th A, and 7th B) of a government high school of district Jamshoro were selected as quasi control and treatment groups. The pre and posttest analyses were carried out. The first pattern t-test analysis revealed that both groups were parallel, however, the latter posttest analysis revealed that treatment group that was taught through social constructivist approach excelled in achieving statistically significant learning outcomes than that of control group that was taught through traditional one-way teaching.

Key Words: Social Constructivism, Scaffolding, Traditional Teaching, Algebra, Variables, Algebraic Operations, Equations

INTRODUCTION

Formal teaching has always been a complex process involving diverse knowledge and instructional decisions. Teacher knowledge seems to be vital element for understanding the teachers' role (Elbaz, 1983). Teaching approaches have evolved and shown clear digression from teacher-centered to the learner-centered tendency, and of course, the teaching could not be said complete without having mathematics and algebra as its integral part.

Algebra is taught as an integral part of mathematics which involves: set theory, numbers and its operations, algebra, geometry and measurement, matrices, and trigonometry to develop reasoning and logical thinking among learners (Government of Pakistan, 2006).

It is also felt that mathematics community is not quite aware of the knowledge required for its effective teaching (Ball, Lubienski, & Mewborn, 2001). Moreover, there is no agreement on the required knowledge (Fennema & Franke, 1992). The National Council of Teachers of Mathematics (NCTM, 2000) recommended introducing algebra and algebraic reasoning in elementary and middle grades throughout the courses of mathematics.

Not only developing countries like Pakistan lack in human and material resources required for effective teaching of algebra but multiple studies reveal that students of developed countries also fall behind proper understanding algebraic concepts because the teachers mostly deal with algebraic variables mechanically without explaning real meaning in social context. It obviously results in poor learning (Demby, 1997; Kieran, 1992; Lee & Wheeler, 1989; Mason, 1996). A number of things contribute toward effective teaching thus a teacher must have proper subject knowledge for teaching (Hill & Ball, 2004), pedagogical knowledge (Wilson, et al., 1987), practical knowledge (Connelly & Clandinin, 1986), knowledge of student thinking (Franke & Kazemi, 2001) etc.

The Government of Pakistan (2009a) recognizes the fact that "The professional preparation of teachers in Pakistan is neither standardized nor based on acceptable professional standards" (p. 5-6). The same document further accepts that: "There is general consensus that quality of teachers is abysmally low" (p. 7). Our existing teaching allows little room for social constructivism as public school teachers often use scolding and corporal punishment within classroom teaching. They hardly allow two way questioning and provide learner friendly assistance in teaching learning process (Bhutto, 2011). Moreover, the local studies reveal that there is little difference between professionally trained and untrained teachers indicating failure of pre service training/degrees i.e. B. Ed. or M. Ed. The teaching revolves around rote based knowledge and learning (Rupani & Bhutto, 2011; Shaikh & Bhutto, 2011).

Educational psychology and pedagogy explicitly underscores the use of different and tailer-made pedagogical approaches, techniques, resourses, and activites according to the needs of the learners thus leaving little option for a method that suits best for all learners all the time (Allama Iqbal Open University, 2011). Both the constructivist and social constructivist approaches to teaching and learning presently are focused and preferred worldwide (Johri, 2005), and Jean Piaget and Lev S. Vygotsky remarkably contributed to those schools of thought respectively.

According to Vygotsky (1978) learning is basically the travel from Zone of Approximal Development (ZAD) to Zone of Proximal Development (ZPD). Within former zone of ZAD a learner knows or is able to do certain things on the basis of previously aquired knowledge and experience while within the latter zone i.e. ZPD a learner can know or

do certain thing through assistance or scaffolding provided by a mature or more experienced adult (or even peer). Vygotsky strongly believes that learning could only take place within a cultural and social setting but not in isolation (Vygotsky, 1978).

Since Piaget's contructivism requires revolutionary changes in curricula, pedagogy, and teacher training and even developed countries have been struggling for making education and teaching learner centered, thus, vygotsky's social constructivism could provide a mediating platform to ensure learner friendly teaching that could lead to a paradigm shift from teacher centered to learner centered education.

In this regard in our local context, algebra has neither been appropriately presented in curricula nor do our public sector teachers use effective teaching methods and approaches. Consequently, algebra is perceived as a dull and drab undertaking leaving the majority of the students weak in the subject. Present quasi-experimental study aims at finding out the effect of teaching of algebra through social constructivist approach on 7^{th} grade learners' achievement.

Literature Review

Like most countries, algebra in Pakitan is integral part of mathematics curricula. Similarly, geometry cannot be sharply separated from algebra. Algebra is a method of computation by signs and symbols using common arithmetic/ mathematical operations (Maclaurin as cited in Katz, 2007, p. 185). Since it uses symbolic variables a, b, c, x, y, z thus is regarded as generalized mathathematics (UXL Encyclopedia of Science, 2002). Like other disciplines it has undergone different evolutionary and conceptual stages. And now modern algebra involves a variety of concepts i.e. from linier to quadratic equations, from factors and exponents to matrices etc.

Reynolds (2001) while reviewing research into teacher effectiveness concluded that two factors mostly affect learners' performance: the opportunity to learn; and time on-task (Reynolds et al., 2001, as cited in Pedagogy and Practice 2004; Crown Copyright, Unit 20, p. 21) while Tellez (2007) after reviewing major reform efforts in curriculum and pedagogy found that "importance of constructivism in educational theory and research cannot be underestimated" (p. 553). Multiple studies support constructivist approach in science related disciplines (Dangel, 2011; Fox, 2001; Phillips,1995; Cobb, 1996).

The main theme of constructivist approaches to teaching and learning is: learners create knowledge on their own to understand and solve a problem through activating and applying their previous knowledge and experiences, and using critical thinking and reasoning. Here an environment is created where learners are not imposed from outside but are facilitated to explore, make sense of the given problems, and arrive at conceptual understanding and solutions through their experiences (Pedagogy and Practice 2004, Crown Copyright, Unit 02—Teaching Models, p. 14).

Piaget's constructivist approach states that children are active learners and construct knowledge upon their previous knowledge on their own through personal interaction and experiences. Piaget believes that construction of knowledge and learning involves two complementary processes i.e. assimilation and accommodation (Johri, 2005). Cobb

"calls for constructivist mathematics educators to develop a new 'mathematico-anthropological context' in order to refine and apply their ideas to mathematics classroom environments" (Boudourides, 1998). Multiple experimental studies at national and local levels reveal that learning through pure constructivists' approach yielded more significant and better learning than that of existing teaching especially in science disciplines (Solangi et al., 2008; Alyas, 2010; Hussain et al. 2011).

Unfortunately, Pakistani education system is typically teacher-centered. Our existing pedagogy can either be called learner centered nor leaner friendly. Research at bot the national and local levels reveal that corporal punishment exists and students are scared of their schools, teachers, and education at large. National Education Policy 2009's first draft accepts that a student "walks to the school dreading what he or she would face." (Government of Pakistan, 2009b, p.49). In this regard, Bhutto's (2011) base-line observation conducted for his quasi-experimental study in District Jamshoro (Sindh, Pakitatn) on 'effects of social reinforcers on learning outcomes of students' also confirms the poor teaching learning situation in local context. It reveals that the teachers use local teaching method that can not fit to any of the recognized teaching methods where teacher writes questions and answers on the black board or dictates them verbally to students. The students only have to copy it down in their 'rough note book' which is rewritten in good hand on 'fair-note-books'. It is almost a common 'pedagogy' for all natural and social sciences disciplines. Teachers devote little time for explaining the concepts properly, if done so they briefly explain through one-way lectures. Learners are afraid of teachers as they often scold and punish students with cane and slaps (Bhutto, 2011, pp. 75-76).

Mansha and Bhutto (2011) in their evaluative study conducted that existing teaching in District Mirpurkhas (Sindh, Pakistan) hardly catered for Bloom's Taxonomy of educational objectives. The affective and psychomotor domains were simply ignored in teaching learning process, however, cognitive domain's lower intellectual skills i.e. knowledge, comprehension, and somewhat application were incorporated while analysis, synthesis, and evaluation remained ignored mostly (pp. 124-125). Faisal Rehman (2004) in the context of his study in teaching of sciences at public secondary schools reveal that our local teaching does not promote critical thinking but it develops only rote-learning.

Vygotsky talks about two processes that he called Zone of Approximate (actual) Development (ZAD) and Zone of Proximate Development (ZPD). Piaget's assimilation and accomodation relates to ZAD and ZPD however both theories contradict in many respects. The learner knows (to do) in former one while in latter one the learner does not know (to do) yet becomes able to know or do through adult assistance or scaffolding. For Piaget cognitive conflict or disequilibrium leads to learning where peer relations play vital role, but for Vygotsky scaffolding is important and adult-young (or teacher-student, or more experienced-less-experienced) relationship works best. Vygotsky believes that every function or learning in a child's life appears twice; first on social or inter-psychological level and then on individual's or intra-psychological level (Vygotsky, L.S. 1978, p. 57). Moreover, Vygotsky in opposition to Piaget believes that

learning cannot take place in isolation but it occurs when a learner interact with other people especially an adult or more experienced one (e.g. a teacher, or a bright peer) within a social and cultural context. Vygotsky (1978) focuses on perception and construction of meaning within a social context through language and other social tools. He claims that things are meaningless unless perceived socially. Something round and black with two hands becomes meaningful when is perceived as a 'clock' in social context through language (p. 39).

Maddux, Johnson, and Willis (1997) in their book "Eucational Computing: Learning with Tomorrow's Technologies" describe four Vyotskian classroom principles:

i. Learning and development is a social, collaborative activity.
ii. The ZPD can serve as a guide for curricular and lesson planning.
iii. School learning should occur in a meaningful context.
iv. Relate out-of-school experience to the child's school experience.

Johri (2005) describes three important phases or modes of learning in Vygotsky's social constructivist learning:

i. Modeling or Imitative learning (Observation)
ii. Instructed learning (Scaffolding)
iii. Collaborative learning (construction of knowledge among social group)

Present experimental study aims at finding out the effect of teaching of algebra through Vygotsky's social constructivism using above three phases i.e. modeling or imitative learning, instructed learning or scaffolding, and collaborative learning or construction of meaning within social group, on the learning outcomes of 7th graders.

Research Question and Hypotheses

The main research question for this study was:

▪ What is the effect of teaching of algebra through Vygotsky's social constructivist approach on the learning outcomes of 7th grade learners of public sector schools in District Jamshoro?

The above research question was broken down into these specific null-hypotheses:

i) There is no significant statistical difference between the pretest scores of control and treatment groups of 7th grade learners of public sector schools in District Jamshoro?

ii) There is no significant statistical difference between the posttest scores of control and treatment groups of 7th grade learners of public sector schools in District Jamshoro?

Objectives of the Study

The present study focused:

- To find out the effect of teaching of algebra using social constructivist approach on the learning outcomes of 7th grade learners of public sector schools of District Jamshoro.
- To find out the effect of traditional teaching of algebra on the learning outcomes of 7th grade learners of public sector schools of District Jamshoro.

- To find out the difference between learning outcomes of 7th grade learners of public sector schools of District Jamshoro through existing (traditional) and Vygotsky's social constructivist approach.

METHOD

Present study involved quasi-experimental design.

Population and sample

All public sector male seventh graders of District Jamshoro comprised the target population of the study; and two existing in-tack classes (sections A, & B) of 7th graders (2010-11) of a Government Boys High School of district Jamshoro were selected as sample for control and treatment groups respectively for quasi-experimental study. The rationale behind selection of quasi-experimental (in-tack groups) was that the researcher wanted to study the phenomenon in a situation where all learners are familiar to one another and feel free and friendly to work with their colleagues in group work or tasks required for collaborative and social constructivist learning.

Data Collection and Analysis

The quantitative data were collected from both groups through pre and posttests and were analyzed using t-test to find out statistical difference between control and treatment groups. On-line t-test calculator was used from GraphPad QuickCalcs website (GraphPad QuickCalcs, 2011). Two patterns of analyses were carried out: pretest scores analysis of both control and treatment groups to find out and ensure homogeneity between the selected in-tack groups in terms of previous knowledge and understanding; and posttest scores analysis of both groups to determine the effect of treatment on learning outcomes of the students.

Validity and Reliability of Research Instrument

The content or face validity of pretest that was also used as posttest was ensured by constructing different items with appropriate ratio to represent all the content of the Exercise 7.10 (Grade 7, Mathematics', Unit 7, 'Algebra' Sindh Textbook Board Jamshoro, 2010). Moreover, the test items were reviewed by the 3-member panel of Faculty of Education and Learning Sciences, Iqra University Karachi who had a doctorate degree in education, and were refined accordingly. Then, it was finalized with certain modifications after being pilot tested prior to experiment on the similar learners other than selected for quasi-experimental groups.

Internal-reliability or consistency of research instrument was measured through item discrimination index. The same test was used as pre and posttest. The posttest scores were used to calculate item discrimination value. The test had 10 items with a mix of selection and supply type questions. The two quasi-groups had 28 and 26 students respectively (the number of students on-roll was quite high but regular students remained almost 60%). Their answer copies were scored and organized in increasing number of marks obtained and divided into two equal halves: i.e. high achievers and low achievers (27 students in each group). Then item-wise correct answers were sought, and for each item/question number of correct answers of lower group was subtracted from that of higher one and finally resultant number was divided by the number of students in each group i.e. 27 to find the value of item discrimination index.

The discrimination value ranged from 0.41 to 0.66 with overall average of 0.587 that indicated considerable internal consistency of the instrument. The following table shows the summary of item discrimination process:

Table 1: Measuring item-discrimination index value of the pretest/posttest:

Item/ Q. No.	*H- Group (correct)*	*L-Group (correct)*	*H-L*	*H-L/ 27 (No. in Each Group) Discrimination Index value*
1.	20	9	11	.41
2.	21	5	16	.59
3.	22	4	18	.66
4.	19	4	15	.55
5.	20	3	17	.63
6.	23	6	17	.63
7.	17	3	14	.52
8.	21	3	18	.66
9.	20	4	16	.59
10.	21	4	17	.63

Ethical Consideration

The researchers sought study-orientation letter from Iqra University (Faculty of Education and Learning Sciences, Gulshan Campus) Karachi, mentioning the affiliation of the researcher with the University and purpose of study, and requesting the Head of Institution to grant permission to conduct quasi-experimental study.

Moreover, the researchers sought free verbal consent from the head of the institution and all of the students of both sections of grade seven (control and treatment groups). The students offered their free consent and extended full cooperation happily.

The head master and the respondents were ensured that strict confidentiality would be followed and their identity would not be disclosed at any cost to avoid any harm to them during and after (by reporting findings) the study.

The researchers acknowledge the full and unconditional cooperation extended during experimentation by the head of the institution, teachers concerned, and the learners of both groups (classes 7th A and B). Without their cooperation and support the research objectives of this study would never have met.

EXPERIMENT AND ITS CONTEXT

Context of the study

In Sindh mathematics is negatively perceived by both learners and their teachers and often called as ‘language of ghosts’. Out-dated teacher training courses and curricula that fail to develop a close link with social life, and lack of opportunities for teachers to groom their professional skills through appropriate refresher courses contributed to poor competency in mathematical skills among teachers which in turn make the mathematics and algebra as dull and dry subject on the part of learners. The traditional one-way teaching and corporal punishment has made learners as passive listeners with little involvement in conceptual learning.

The government of Sindh since last five years has been providing remarkable initiative for uplifting quality of education by providing free of cost all the textbooks to public sector students from grade 1 to 10. The Sind Textbook Board Jamshoro's curriculum of mathematics at grade seven involves nine units including two units related to algebra: Unit 7 titles as 'Algebra', and Unit 8 titles as 'Geometry'. The exercise 7.10 of Unit 7 involves application of algebraic concepts to daily life through solving word problems using operations of variables (Sindh Textbook Board Jamshoro, 2010).

Present study focused to teach the Exercise 7.10 (there were ten textual or word-problems of algebra) through constructivist approach. For this purpose two existing in-tack sections of grade seven—7th A, and 7th B classes of Government Boys High School Sehwan, District Jamshoro were selected as control and treatment groups respectively. Both groups had taken pretest and posttest before and after experimentation respectively. The treatment involved Vygotsky's three constructivist processes for each word problem:

i.Modeling (the teacher who was trained for this study used to solve the algebraic problem using loud thinking technique so that learners can observe and imitate that how the problem could be dealt properly by using previous knowledge and experience. Here the teacher spoke loudly about the ideas coming to his mind while dealing with the problem in somewhat organized way: how to look at the problem, how to convert word problem into appropriate algebraic equation using letters (a, b, c, or x, y, z) as variables, how to put value, and how to simplify or solve equation by doing mathematical operations. It not only served as modeling but also scaffolding).

ii.Scaffolding (here the teacher step by step taught how to form algebraic equation and put value and solve the problem. Teacher's presentation, two-way questioning, discussion, and use of audio-visual aids i.e. blackboard and chalks, charts etc served as scaffolding. Moreover, collaboration also overlapped with scaffolding).

iii.Collaboration (here the teacher initially selected bright students of the class, and divided the class into six groups so that a group should not have more than four students, then the teacher added at least one bright student in each group for appropriate immediate scaffolding. The groups initially took five minutes to brainstorm and discuss and share the problem in hand, then worked out steps and solved the problem through collaborative efforts and sharing. The teacher was also available to help out any groups if needed. Finally, a few students' group presentations were allowed).

Control and Treatment Groups

The two in tack sections of grade 7 of a public secondary school of District Jamshoro (Sindh, Pakistan) were selected for the study. The section 7th A was selected as control group that was observed for 12 working days including 6 days each for before and during the experiment. The observatory findings from two students of control group revealed: The math-teacher solved the word problems on the blackboard using one-way lecture. He occasionally involved one or two bright students by asking a few yes/no or simple questions leaving the remaining majority uninvolved in teaching learning process. The teacher did not take much time to explain how to convert a word problem

into an algebraic equation. The main focus of the teaching was to maintain silence during classroom teaching through verbal scolding or even corporal punishment. The activities that support learners' active involvement i.e. brainstorming, two-way questions, discussion, loud thinking, consideration of previous knowledge, group work, students' presentations etc were simply missing thus making algebra a dull and dry subject for learners.

The existing section 7th B of grade seven of the same public secondary school was selected for treatment and was taught through Vygotsky's three phases of social constructivist learning i.e. modeling or imitative learning, instructed learning or scaffolding, and collaborative learning or construction of knowledge within social context. For this purpose a science teacher from the same school who taught another subject in the class selected for treatment was trained for administrating the treatment according to above three steps based on Vygotsky's social constructivist learning. The same topics (exercise questions) were covered. Both the groups (control and treatment) had students with mixed abilities. The demographic data collected from both groups reavealed that students in both groups almost equally represented rural and urban population. For present study urban was operationally defined as students living within the limits of town where the school was situated and students coming from the union councils outside the town limits (though they were part of same Tahsil or administrative area) were treated as rural. Moreover the t-test analysis of pretest scores confirmed that both groups were parallel and there was no significant statistical difference between overall previous learning and understanding. The treatment lasted for six working days with one 40 minute period covering the same topics (algebraic word-problems) taught by the teacher in control group. The teaching of both groups i.e. teaching of algebra through traditional teaching and Vygotsky's social constructivist approach was conducted simultaneously within their respective classes to control effect of certain extraneous variables i.e. boredom, weather or temperature on students learning outcomes.

Since the objective-type questions have greater reliability, validity (content coverage) and objectivity in terms of examiner's biasness in scoring thus the pre test that was also used as post test was designed with 10 objective type items having 7 MCQs and 3 Blanks. The objective type questions have greater reliability.

The following table sums up present quasi-experimental design steps and their objectives:

Table 2: Quasi-experimental design steps:

Steps	*Procedure*		*Objective*
1.	Selection of existing in-tack group 1, Control Group	Selection of existing in-tack group 2, Treatment Group	To ensure familiarity, positive interaction and communication within selected groups for successful constructivist and collaborative treatment.
2.	Pretest	Pretest	To measure whether the groups are matching or not; and to find out the difference of previous knowledge in both groups
3.	No treatment	Treatment	To manipulate the constructivist approach
4.	Posttest	Posttest	To measure the effect of independent variable through difference of posttest scores

FINDINGS AND DISCUSSION

The t-test was used to analyze the pre and posttest scores of control and treatment group. On-line GraphPad QuickCalcs was used for t-test calculation and analysis (GraphPad Quick Calcs, 2011). Two patterns of analyses were carried out: pretest scores analysis of control and treatment groups accounted for finding out whether or not both groups were parallel in previous knowledge and understanding, and posttest scores analysis catered for finding out the effect and statistical significance of the treatment (teaching through constructivist approach) on the students' learning outcomes respectively. The overall t-test findings reveal that both groups were parallel in terms of previous knowledge and the treatment group excelled in achieving statistically significant learning outcomes as compared to control group who were taught through traditional one-way teaching.

Pretest Scores Analysis of Control and Treatment Groups

The t-test analysis of pretest scores of both groups revealed that the difference of mean scores was not statistically significant thus the null hypothesis could not be rejected (but accepted). It implies that both groups were parallel in terms of previous knowledge.

Table 3: Presents summary of important statistical aspects of pre-test scores of both groups

Statistical Aspects	*Value*	*Results*
Two-Tailed P-value is→	0.3319	Not statistically significant result
Mean of Group One minus Group Two→	-0.54	
Confidence level →	0.05 or 95%	
Standard Error of Difference→	0.544	
df (degrees of freedom) →	25	
t-value (tabulated or critical)→	2.06	
t-value (observed) →	0.9896	

Table 4: Presents mean SD, SEM, and N of pre-test scores of both groups:

Group	*Pretest (Control grout)*	*Pretest (treatment group)*
Mean	2.35	2.93
SD	2.45	2.09
SEM	0.48	0.39
N	26	28

Posttest Scores Analysis of Control and Treatment Groups)

The t-test analysis of pos-ttest scores revealed that there was statistical significance between the mean scores of control and treatment groups and the treatment group achieved significantly better learning outcomes. It implies that the effect of treatment was statistically significant and the group taught through constructivist-approach excelled in achieving better learning outcomes than that of control group who were taught through traditional one-way teaching method.

Table 5: Presents summary of important statistical aspects of post-test scores of both groups

Statistical aspect	*Value*	*Result*
Two-Tailed P-value is→	0.0415	Statistically significant
Mean of Group One minus Group Two→	-3.31	
Confidence level →	0.05 or 95%	
Standard Error of Difference →	1.539	
df (degrees of freedom) →	25	
t-value (tabulated or critical)→	2.06	
t-value (observed) →	2.1492	

Table 6: Presents mean SD, SEM, and N of post-test scores of both groups:

Group	*Post-test (Control grout)*	*Post-test (treatment group)*
Mean	5.31	9.04
SD	7.01	7.07
SEM	1.37	1.34
N	26	28

Both the in-tack groups were parallel and the treatment group showed better learning outcomes. It was noticed that the traditional teaching in control group influenced a few students to get better learning outcomes while leaving the majority of the class unaffected. Moreover, test scores showed either-or situation—a few were high achievers and resting majority remained low achievers. While in treatment group the researchers found that there was a gradual trend reflecting a better and contrasting picture as most of the students were influenced by treatment to achieve greater learning outcomes. It indicated and confirmed that the treatment based on Vygotsky's social constructivist approach worked better that that of traditional one-way teaching.

CONCLUSION

The researchers conclude from the findings of quasi-experimental study that Vygotsky's social constructivist approach worked better than our existing one-way teaching. It not only yielded better learning outcomes but also provided opportunities for students to interact with others, to share one's ideas and listen to others' (peer or teacher) point of view, to develop social interaction and communication skills, and to learn collaboratively in a free and friendly environment. Lot of work is to be done for a paradigm shift from one-way to interactive social constructivist teaching and learning in the areas of pedagogy, curriculum revision, pre and in-service teacher trainings throughout developing countries.

Limitation of the study:

- Present study involved quasi-experimental design that could be extended to pure experimental designs involving both boys and girls students for further studies.

Recommendations:

- The prevailing teacher trainers within pre and in-service teacher training institutions of Pakistan have failed to produce required effective and learner friendly pedagogical skills among public sector teachers. Therefore, it is time for concerned stake holders to

bring professional degrees and courses in line with learner friendly skills and attitude. It calls for creation of specific cadre for teacher trainers that is missing in our country (Pakistan).

- The existing management and monitoring system needs revolutionary changes because no professional degree or refresher course support corporal punishment, teachers' illegal monopoly and dominance on learners yet the actual educational scenario openly rejects all those claims. It calls for revolutionary changes in the criteria for appointment of head teachers and higher administrators so that teachers may be bound to ensure learner friendly pedagogy, activities, and resources.
- The curricula and examination system need prompt revision because they support knowledge-based and regurgitating-based teaching that in no way is acceptable in present era of knowledge explosion and it should be brought in line with modern theories and concepts of teaching and learning with standardized formative and summative assessment.
- The social constructivist teaching approaches are more effective than prevailing traditional ones therefore call for extensive professional development and refresher courses for in-service teachers are the need of the hour.
- Short-term country-wide refresher courses for professional development of teachers is the need of the hour to teach and train public sector teachers how to make teaching learning process more effective through learner-friendly activities like engaging their students in individual and group work, asking two-way questioning, allowing discussions, and using low or no cost audio-visual aids and learning materials. They cost nothing but can change everything.

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