Constructivists' Didactics in Teaching Technology Education in Ethiopian Technology Universty- Practices and Challenges (The Case of Adama Science and Technology University)

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The present study has been intended to assess the applicability of didactics of constructivism in the instructional process of technology education and identifying the prominent constraints that hinder the implementation of constructivist didactics in technological education classes. A descriptive survey research methodology was designed in order to attain the purpose. Simple random sampling and availability sampling techniques were utilized to select sample from the study site. Accordingly, 42 teachers and 147 students were selected from four technology education departments. The data were collected through questionnaire and observations. The analysis of quantitative data was made by descriptive statistics like frequency counts, percentage, t-test, and Ch-squire test.The result of the study revealed that most of technology education instructors neither undertake prior skill analysis nor attempted to integrate prior knowledge and skill lessons in their daily class lesson. Moreover, technology instructors are not enthusiastic to engage students to discover a new skill and apply in to practice. Diverse and goal free evaluation techniques were not employed to assess the skill mastery level of students. Furthermore, the research has shown that in availability of facilities, and diversity of student interest and lack of teachers training in modern techno- pedagogy found to be the major challenges in the practicality of constructivist didactics in technology education. Thus, it can be concluded that the major challenges in the utilisation of constructivist approach in teaching technology education are shortage of the required facilities and trainings. Therefore, it was recommended that the university should have to fulfil the required facilities and design specific and peculiar professional development programmes in order to acquaint instructors with modern instructional skills and techniques of technology education.

Key Words: Constructivism, Constructivist didactics, Technology Education, Techno-pedagogy

1. Introduction

Excellence in technology education comes from innovative teaching techniques and appropriate instructional materials. This would require one to change the traditional way of delivering technology lessons in to modern approaches. For quarters of a century, the implicit approach underlying the curriculum and pedagogy of technological education has been behaviorism, but today's dominant theory of learning and teaching becomes constructivism (Mayer, 2003). Recent research findings' concerning technological education has discussed the usefulness of constructivist approaches positioning those principles within the framework of a constructivist perspective. The principles emphasize that, individuals based on their prior skills and experiences in their effort to sense their environment, actively construct meaning and mastery of skills (Doolittle and Camp, 1999).

Constructivism contrasts with behavioral view of learning that stress the influence of environment on the person, and also with cognitive accounts that place the locus of learning within the mind with little attention to the context in which it occurs (Bruning, 1995).The central idea in constructivist view of technological education is to help the student think about the nature of learning and develop conscious control over tools for learning, the position is taken that major tasks of technological education institutions are to increase capacity for learning that the student's construction and mastery of skills can become increasingly sophisticated and efficient if we make the student an insider to the learning process (Joyce and Weil, 2003).

As per constructivist didactics, teachers don't teach in the traditional sense of standing in front of a room of students and delivering instruction, rather they use materials with which learners become actively involved through manipulation and social interactions. Activities stress student's observing, collecting data, generating and testing hypothesis and working collaboratively with others (Schunk, 1996).

Thus viewed, models of teaching aren't only models for helping students construct knowledge and skills; they are learning strategies that can be taught directly to the students. Therefore, the teacher teach students to develop concepts and clues, to teach themselves skills, to use metaphorical thinking to solve problems and to inquire as a scientist does. This major and overarching characteristic of effective learning is nowadays supported by robust empirical evidences. It means that students are not passive recipient of information but that they learn how to learn, and actively construct their own knowledge and skills (Cobb, 1994).

Constructivists also advocate that, learning should involve social negotiation and mediation. This contention refers to the role of social interaction and cooperation works for the development of socially relevant skills and knowledge. Moreover, they asserts that contents of skills lessons should be relevant to the learner and with in the frame work of the learners prior knowledge and skill. Teachers are expected to serve primarily as guides or facilitators of learning, but not instructors, students on the other side should be encouraged to become self - regulatory, self mediated and self aware (Briwn and Palincsar, 1997).

According to Fosnot (1999), there are stages that help teachers to use and move towards constructivist didactics in teaching different subjects. These stages have practical implication in technological educations (Doolittle and Camp, 1999). Introduction is the first and foremost stage, in which prior skills and knowledge can be activated in many ways. Recall previous knowledge and skills in technological education, introducing new theories and principles, asking some questions, which make students to be active participant and eagerly involve in their technological education.

Exploration is the second stage in which students engage in collaborative and cooperative learning, experimentation, employ learners centered strategies, practice enquiry approach, and discuss with teachers and classmates about technological facts and issues. It is followed by the stage of experiential mode of learning, in which students interact and challenge each other and discover new ideas, construct their own understandings. Hence, meaningful learning occurs with authentic learning tasks.

Abstract conceptualization and understanding is the stage in constructivist pedagogical tenets in which, learning technical skills and theories, is a matter of associating and attaching a new meaning to past cognitive experiences, constructing new skills, explanations, and experiences and making decisions. It is followed by the stage of reflection in which, constructivist teacher encourage students to reflect on their current skills and findings in the light of earlier hypothesis. Application and evaluation is ongoing process of constructivist approach of learning and teaching. This process enable constructivist technology teacher to assess whether the learner has achieved understanding of concepts, theories and principles of technical skills or not. In general, such stages of strategies can be adopted by a committed technology teacher to be both constructive and effective technology teacher (Fosnot,1999).

The constructivists' didactics challenges the longstanding societal view that knowledge and skill came in finished and polished pieces and the job of educational institutions is to take the piece out of the store house and give them to the learner intact until the picture puzzle of essential knowledge and skill is complete (Joyce and Weil, 2003). This conceptions contrasts sharply with the still prevailing, more or less implicit view of learning reflected in a lot of current teaching-learning practices in technology education, namely as the transmission and absorption of skills and knowledge gained and institutionalized by past generations (Bergen, 1998).

In Ethiopian context, developing student's problem solving skills are among the major educational objectives stated in the education policy and education sectors development strategic documents. This abilities and skills are partly to be attained through expanding access and assuring qualities of technological education and trainings. Incorporating modern practices and research findings from the contemporary pedagogical and psychological theory of learning into the existing practices of technological education are among the areas that deserves serious considerations in educational quality assurances.

Traditionally, discipline expertise has been the most respected feature of a university teacher. In recent years, however, there have been discussions about the need to improve university teachers' pedagogical thinking and skills as well. As a consequence, training of university teachers has recently become a widespread trend in many countries (Fosnot, 1999).

As to recent development of learning theories and instructional skills, efficient mastery of skills and acquisition of knowledge in technological education can be best developed in the learners, when the teaching and learning process are approached from the constructivist perspectives. Technology education is holistic and practically based curriculum, which is ideally suited to constructivist approaches to teaching and learning (Bergen, 1998).

Adama Science and Technology University is one of the pioneer technical universities in Ethiopia, which strives to achieve excellence in technological education as its major objectives. To this effect, Adama Science and Technology University has launched Pedagogical Skill Improvement and Support Training in 2005, with the major motto of acquainting technology instructors to be aware and implement modern approaches of teaching technological skills so as to provide quality technological education.

The aim of Pedagogical Skill Improvement and Support Training is to create reflective teachers, who recognize the value of reflection in education. It also aimed at look up the professional quality of instructors and learning of students. It provides instructors with a practical training to support their development as effective teacher, use modern active learning methods and employ student centered teaching methods to be reflective practitioners in technology education.

The endeavor to assess the challenges in the implementation of constructivist didactics as recent active learning and teaching strategy in the teaching-learning process of technological education is a virgin area of focus. In view of this, the study tries to evaluate the practices, prospects and challenges in the use of constructivist didactics in the teaching-learning arena of technological education in Adama Science and Technology University.

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2. Statement of the Problem

Experience and observations tell us that technological education in many countries is disheveled with many problems. The practical activities in which students engaged in technological education have low cognitive demand and learning of theoretical facts and principles. Most of the instructional process in technological education gives more emphasis on memorization of algorithms and transmissions of the already finished and polished skills rather than encouraging learners to construct their own skills, technical and conceptual schemes. Many factors could be hindrances to the instructional process of technological education in general and the application of constructivist strategies in particular. The textbook designed are inappropriate in facilitating the students' interactions with the materials to be learned, in availability of instructional resources, equipments and facilities are among the major hindrances (Joyce and Weil, 2003).

As to constructivist pedagogical paradigm, learning in technological education should be taking place in authentic and real world environments. They affirm that:-

> *"When an automotive technology student learns to operate a micrometer in the course of solving an authentic problem such as the construction of a solar powered car, the knowledge constructed will be more accurate and viable than if the student merely practiced using the micrometer in isolation" (Doolittle,and Camp 1999:7)*

Teachers' beliefs, skills and understandings on how mastery of skills in technological education best acquired and developed in students can be put under question. The teacher's knowledge base and skills in applying and using elements of constructivist didactics to foster the instructional process in technological education is also another factor. The students' beliefs about teaching and learning in technological education could also be another problem. However, it became very clear that under situation that are apart from the constructivist philosophical tenets of teaching and learning, learning technological skills is almost incomplete and unsustainable even in their carrier efficiency (Doolittle and Camp, 2003).

Hence to either improve the existing practices in technological education classes and to identify the major impediments that constrained in the practical usage of didactics of constructivists in technology education departments of Adama Science and Technology University, rigorous investigation required to be made.

3. Purpose of the Study

The major purposes of these research undertakings are;

- Assessing the practicability and applicability of didactics of constructivism in the instructional process of technology education by instructors who are certified in professional teachers' education.
- Identifying and analyzing the prominent constraints that hinder the practical usage of constructivist didactics in technological education classes.

In order to attain the purpose, the study is devoted to answer the following basic research questions.

- To what extent are constructivist didactics used in the instructional process of technological education classes?
- What are the key impeding challenges in applying the constructivist didactics in the teaching learning process of technological education classes?

4. Research Design and Methodology

4.1. Research Design

In this study a descriptive survey research methodology was designed to examine the state of application and usage of constructivist didactics and to identify the constraints in their application in technological education classes in Adama Science and Technology University.

4.2. Sample and Sampling Technique

The target population was technology teachers and students in Wood Work Technology, Automotive Technology, Construction Technology and Manufacturing Technology departments. These departments are selected by using purposive sampling techniques because of their programmes are solely technological education. Teachers, who taught fulltime in the University, and graduated and certified in pedagogical skills improvement Program were selected by using available sampling techniques because of their manageable sizes. The final year students in each department were selected with simple random sampling techniques. These sources helped the researcher to acquire first hand and dependable information and draw valid inferences.

4.3. Instrumentation

The instruments employed in this research were questionnaire, and personal observations. Data were gathered from teachers and student through questionnaire. Classrooms and workshop instructional processes were observed using structurally designed observation checklists.

4.4. Data Collection

The Total Design Method (TDM) of conducting surveys was followed in all stages of the questionnaire construction and administering process. A packet containing a cover letter, instructions for administrating the questionnaire and copies of the questionnaire was distributed to teachers; who graduated from Pedagogical Skills Improvement and Support Training (PSIST). Another set of questionnaire was distributed to randomly selected final year technology students in the four departments. Personal observations of the researcher were also sources of dependable information.

4.5. Data Analysis

Data secured through the above mentioned instruments was critically analyzed both qualitatively and quantitatively. The quantitative data gathered through questionnaire was tabulated and computed using the statistical package for social science (SPSS version-20for windows).Descriptive parameters including Chi-squire test and percentage were employed to organize and analyze the quantitative data. Data gathered through observations were tabulated and analyzed qualitatively and serve as a supplement for quantitative data secured through questionnaire. Finally, summary of findings, conclusions and recommendations were drawn and forwarded.

5. Analysis and Discussions

In this part of the paper an attempt was made to analyze the respondents' reflections about the extent of application of the major stages in the didactics of constructivism and major challenges which hinder its applications in technology educations lesson.

Extent of Application of Didactics of Constructivism

Table.1.Introduction

Items	Respondents		Response Value					Chi-Sq Test	
			1	2	3	4	5	T-Value	P-Value
1.1.Prior skill Analysis	Students	No.	34	54	38	17	4	6.505	0.164
		%	23.1	36.7	25.9	11.6	2.7		
	Teachers	No.	3	24	7	4	4		
		%	7.1	57.1	16.7	9.5	9.5		
1.2.Integration with prior lesson	Students	No.	5	34	21	37	50	24.665	0.000
		%	3.4	23.1	14.3	25.2	34.3		
	Teachers	No.	2	2	4	20	14		
		%	4.8	4.8	9.5	47.6	33.3		

Key: 5=Always 4=Frequently 3= Sometimes 2=Rarely 1=Never

The above table 1.1 depicted that (88) 59.8 % of students revealed that technology education instructors did not undertaken prior skill analysis and rarely practice before conducting a new technological lesson, so as to activate their prior skills and experiences. While large number of instructors 24 (57.1%) of them noted that they rarely analysed the prior skills of their students before introducing and teaching a new skill lessons. The Ch-squire test result indicated that there is no significant (at alpha level of 0.05) difference between teachers' and student opinions concerning the prior skill analysis practices of instructors in technological education classes.

In the same table, item 1.2, most of the instructors, 34(80.9%) revealed that integrating present lessons with prior lessons are their usual instructional practice in their technological education classes. Similarly, most of the student respondents, 87(59.5%) revealed that their instructors are customary to integrate prior knowledge and skill lessons with their daily class lesson. In this regard, the Ch-squire test result indicated no significant opinion difference (at alpha level 0.05) between teachers and student respondents. Incongruence with this analysis results, literatures relevant to the issue bared that prior knowledge and experience should be analyzed through recalling and introducing new theories and principles, asking some questions, which make students to be active contestant and eagerly involve in discussions and classroom discourses in technological education (Fasnot, 1999). As per the constructivist perspective, content and skills should be understood within the framework of the learner's prior knowledge and experience. Prior experience is one of the foremost tenets of constructivist theory.

In this regard, Doolittle and Camp (1999), asserts that the key to all learning is the prior knowledge and skills brought to the learning situation by the learner, if the new knowledge is to be meaningful to the learner, they must be able to relate that new knowledge to their previous ones. This implies that, in a constructivist technology education classrooms, new learning activities need to be constructed around students' prior skills and knowledge in order to result in optimal and desired competencies.

Table 2.2. Exploration

Items	Respondents		Response value 1	2	3	4	5	Chi-Sq. Test T-Value	p-value
2.2.1.Group organization to apply newly learned skills	Students	No.	27	29	55	16	20	49.642	0.000
		%	18.4	19.7	37.4	10.9	13.6		
	Teachers	No.	0	2	12	25	3		
		%	0.0	4.8	28.6	59.5	7.1		
2.2.2.Encouragement to discover new skills	Students	No.	44	32	39	20	12	30.870	0.000
		%	29.9	21.8	26.5	13.6	8.2		
	Teachers	No.	0	4	14	18	6		
		%	0.0	9.5	33.3	42.9	14.3		

Key: 5=Always 4=Frequently 3= Sometimes 2=Rarely 1=Never

Data in table 2.2(2.2.1), shows that the majority, 56.1 %(84) of students revealed that as a process of exploration stage of skills learning, their instructors are not familiarized to form and organise groups to facilitate the application of newly learned skills in to practice. Similarly, 37(88.1%) of teachers admitted that they are not exercising group organisation for the sake of applying students' newly learned skills in to practical situations. In this regard, the Ch-square test result indicates that there is no significant difference at (an alpha level 0.05) between the experiences of both respondents, in which both agree that practical application of learned skills occasionally was not the usual practice of skills lessons instructions.

Contrary to this finding, researchers advise that technology education requires technology instructors to work in an integrated manner. Technology topics can become 'vehicles' for learning from which students can engage in 'worthwhile exploration of meaningful content that relates to and extends their life experiences and understanding of the world' (Murdoch &Hornsby, 2003; Compton and France, 2006).

With regards to teachers' initiatives to encourage their students for self discovery, 76(51.7%) of students revealed that their instructors are not enthusiastic to engage them to discover new skills in their technology education classes. While 56(57.2%) of teachers revealed that they do encourage their students to be involved in discovering new skills in their technology lessons. Though, there are opinion differences between the two groups of respondents, the Ch-squire test result shows that there is no significant difference at alpha level 0.05 in their response. In this regard, constructivists assert that in order to improve the quality of learning in technology education, teachers should have to promote discovery and construction of skills and knowledge. This requires definition of the learning environment, the roles of instructors, and the roles of learners and of the relationship among them.

Table 2.3. Experiential process Stages

Items	Respondent		Response value 1	2	3	4	5	Chi-Sq. Test T-Value	p-value
2.3.1.Relating class room skill activities with real experience	Students	No.	30	31	53	19	14	15.853	0.003
		%	20.4	21.1	36.1	12.9	9.5		
	Teachers	No.	0	6	18	8	10		
		%	0.0	14.3	42.9	19.0	23.8		
2.3.2.Encourage to apply newly skills	Students	No.	24	26	54	24	19	28.478	0.000
		%	16.3	17.7	36.7	16.3	12.9		
	Teachers	No.	2	0	10	20	10		
		%	4.8	0.0	23.8	47.6	23.8		

Key: 5=Always 4=Frequently 3= Sometimes 2=Rarely 1=Never

As one experiential stage of constructivist didactics in teaching technology, relating class room skill activities with real experience has paramount advantage to increase the skills retention capacity of learners. In this regard, the majority of student respondents reflected that their technology instructors did not try to relate their class lessons with the real and practical experience outside the school. On the other hand, most of instructors 20 (57%) revealed that they occasionally exercise such a practice as their instructional roles. With regard to newly acquired skills application, 80(54%) of student respondents revealed that their technology instructors occasionally encourage them to apply their newly skill lesson to employ and apply in real practices.

On the contrary, 30(71.4%) of instructors revealed that they frequently encourage their technology students to apply their skills in to practical situations. The Ch-Squire computational result indicates that there is no significant difference between the two groups of respondents at (alpha level 0.05). As per literature, constructivist instructor are expected to,

> *"emphasizes the need for quality, authentic, or real-world experiences...that provide the student with...learning cues that facilitate later thought and behavior. Students will tend to interact with skills that they find interesting, necessary, and goal related. Thus students will learn best when they see both the purpose and need for learning a set of skills, that is, when they find the skills relevant to their daily situation" Doolittle and Camp (1999).*

Similarly, Turnbull (2002) argues that technology education within the classroom needs to reflect authentic technological practice as much as is practical. The implication here is that, if students are to understand technological process, they must be actively engaged in practice that reflects the culture of real technological practice.

Table 2.4. Abstract Conceptualisation and Understanding

Items	Respondent		Response value 1	2	3	4	5	Chi-Sq Test Value	p-value
2.4.1.Provision of inquiry-based learning activities	Students	No.	13	29	61	24	20	22.009	0.000
		%	8.8	19.7	41.5	16.3	13.6		
	Teachers	No.	0	4	20	18	0		
		%	0.0	9.5	47.6	42.9	0.0		
2.4.2 .Efforts to acquaint with integrated skills	Students	No.	11	36	51	31	18	21.668	0.000
		%	7.5	24.5	34.7	21.1	12.2		
	Teachers	No.	0	4	8	22	8		
		%	0.0	9.5	19.0	52.4	19.0		

Key: 5=Always 4=Frequently 3= Sometimes 2=Rarely 1=Never

Provision of inquiry based learning activities as instructional role of technology teachers are mandatory to promote the technical competency of technology students. In line with this, most of student respondents 90(61.2%) revealed that they did not offered an opportunity to be delivered an inquiry-based learning activity in their technology lessons.

On the contrary, a large proportion of instructors, 24(57.1%) revealed that they provide inquiry based learning activities for their technology learners. The observation result indicates that teachers were not habitual in giving an inquiry based learning activities. This has an implication that most of instructors are accustomed to transfer finished and polished pieces of technical skills to students. However, inquiry learning is clearly a teaching approach that lends itself to the authentic delivery of technology in the classroom. The inquiry approach reflects the belief that, for learners, active involvement in construction of their knowledge and skills as essential for effective learning (Murdoch, 2004). Inquiry methodology and integrated curriculum are also supported by Caine and Caine (1990, cited in Murdoch, 2004). They argue that the brain seeks pattern, meaning and connectedness; methods that move from rote memorization to meaning-centered learning (Murdoch, 2004).

Table 2.5. Reflection Stage

Items	Respondents		Response value					Chi-Sq Test	
			1	2	3	4y	5	Value	p-value
2.5.1. Reflection of current skills	Students	No	33	45	27	31	11	28.393	0.000
		%	22.4	30.6	18.4	21.1	7.5		
	Teachers	No	0	4	10	20	8		
		%	0.0	9.5	23.8	47.6	19.0		

Key: 5=Always 4=Frequently 3= Sometimes 2=Rarely 1=Never

Table 2.5(2.5.1) depicted that 72(49%) of students revealed that reflection of current skills as stage of constructivist didactics was exercised frequently by the instructors, while 42(28.6%) of them reconfirmed that it was frequently practiced in their technological lessons. Similarly, 28(66.6%) of instructors revealed that they are attempting to encourage their technology students to reflect their currently acquired skills. In this regard, constructivists advocate that an effective constructivist instructor should have to engage technology students to reflect on their current skills and findings in the light of earlier hypothesis, which facilitate engagement in reflective practice by making links between theories of technological practice and their own learning.

Table 2.6. Evaluation Stages

Items	Respondents		Response value					Chi-Sq. Test	
			1	2	3	4	5	T-Value	p-value
2.6.1Provision of thoughtful evaluating activities	Students	No	18	36	56	23	14	14.557	0.006
		%	12.2	24.5	38.1	15.6	9.5		
	Teachers	No	0	4	20	14	4		
		%	0.0	9.5	47.6	33.3	9.5		
2.6.2.Use of goal free assessment systems	Students	No	31	44	38	22	12	40.323	0.000
		%	21.1	29.9	25.9	15.0	8.2		
	Teachers	No	1	6	8	26	1		
		%	2.4	14.3	19.0	61.9	2.4		

Key: 5=Always 4=Frequently 3= Sometimes 2=Rarely 1=Never

As per the principles of constructivism, evaluation in technology students should be integrated with teaching. In this respect, data on the table 2.6(2.6.1) depicted that, 92(62.6%) of students revealed that their instructors rarely provide thoughtful evaluation activities, while almost half of instructors confirmed the same, small proportion 14(33.3%) of instructors revealed that they have frequently offer thoughtful and evaluating activities. The chi-squire test result indicated that there is a significant opinion differences (at alpha level 0.05) between the two groups of respondents.

With regards to diversity of goal free assessment system, the majority of student respondents 82(55.8%) confirmed that their technology instructors were rarely evaluate them through diverse and goal free evaluation techniques. Contrary to this, 26(61.9%) of instructors revealed that they are employing diverse and goal free evaluation techniques in order to check their knowledge construction and students technological skills mastery. The chi-square test indicated that there is a significant opinion difference between the two groups of respondents at an (alpha level 0.05).

As per literature, evaluation and assessment in constructivist settings is goal-free (Jonassen, 1992). In addition, evaluation in constructivist environments is context dependent. That is, the context within which knowledge and skills construction is taken into consideration during evaluation. Constructivist environments promote the creation of multiple perspectives within a variety of contexts. They adhere that there is not one correct understanding and way of solving a problem. Students are encouraged to utilize multiple ways of solving problems and justify their solutions. The creation of multiple perspectives and viewpoints calls for multiple assessment methods. One of the principles of constructivism is that evaluation in technological students should be integrated with teaching at every stage.

In addition, constructivists are more concerned with assessing the knowledge construction process and not as much concerned with assessing knowledge. Multiple evaluation methods are employed to document the learners' growth and look for changes in their thinking and learning skills (Vrasidas, 2011).

Table 2.7 Major Challenges in the Application of Constructivist Didactics

No.	Challenges	Subjects	Responses in percentage of Ratings				Ch-Sq. Test
			1	2	3	4	
1	In availability of facilities	Students	12.9	20.4	34.7	32	
		Teachers	14.3	14.3	57.1	14.3	0.037
2	Large number of students in a class	Students	8.8	16.3	46.3	28.6	
		Teachers	4.8	4.8	21.4	69.0	0.000
3	Diversity of students interest	Students	16.3	28.6	34.7	20.4	
		Teachers	14.3	0.0	19.0	66.7.	0.00
4.	Students unwillingness to cooperatively learn	Students	21.8	40.8	23.8	13.6	
		Teachers	9.5	57.1	33.3	0.0	0.010
5	Teachers lack of interest	Students	13.6	17.0	32.0	37.0	
		Teachers	9.5	9.5	47.6	33.3	0.259
6	Rigidity of time table	Students	6.1	23.8	42.9	27.2	
		Teachers	0.0	14.3	38.1	47.6	0.038
7	Lack of teachers training in modern techno- pedagogy	Students	11.6	21.1	42.9	24.5	
		Teachers	10.1	20.1	39.7	30.2	0.014

Key: 4=Most serious 3=Serious 2=Not serious 1=Not applicable

As it can be seen from table 2.7, 64.7% of students and 71.4% of teachers agree up on the lack of in availability of facilities and organized was the major challenge in the implementation of constructivist didactics in the teaching-learning arena of technology subjects. The Chi-Squire test (0.037 at alpha level 0.05) result revealed that there is no significant difference between the two groups of respondents. This is in line with (Joyce and Weil, 2003),that in availability of instructional resources, equipments and facilities are among the major hindrances to utilize and practice constructivists approach in teaching technical subjects.

In the same way, the two groups of respondents were asked to give their response to the fact that large in technology class rooms affect the practice of constructivists approach in the instructional process of technology education. The majority of student respondents (74.9% and 90.4%) of teacher's respondents affirmed that it was the serious challenge. The Chi-squire test result (0.00 at alpha level 0.05) indicates that there is a significant association between the responses given by two groups of respondents.

In the same table, item 3 indicates that whether diversity of students interest affect the implementation or exercising of constructivist approach in teaching–learning process of technology education. Most of the student respondents (55.1%) and (66.7%) of teachers revealed that diversity of student interest was a challenge. The Ch-Squire test result (0.00 at alpha level 0.05) indicates that there is no significant difference between the responses given by students and teachers respondents.

With respect to (item 4), the majority of respondents (62.6%) of students and (66.6%) of teachers confirmed that students unwillingness to cooperatively learn was not a challenge in the practical implementation of didactics of constructivism in technology classes. The Ch-Squire test result (0.010 at alpha level 0.05) indicates that there is no significant difference between the responses given by students and teachers respondents. On the other hand, the majority of respondents of the two groups with no significant difference revealed that teacher's lack of interest and rigidity of time table found to the major hindering factor in the implementation and use of didactics of constructivism in technology education.

The last item in the table indicates that, 73.5% of students and 66.7% of teachers reflected that lack of teachers training in modern techno- pedagogy and areas of modern approaches of teaching technological skills and contents are the serious challenges to make in to practice. In this regard, literature confirmed that shortage of instructional facilities and skills are factors in the implementation of constructivist didactics in technology education (Joyce and Weil,2003).

6. Summary and Conclusion

The study revealed that most of technology education instructors were not undertaken priors kill analysis before conducting a new technological lesson so as to activate learning. Moreover, some instructors did not attempt to integrate prior knowledge and skill lessons with their daily class lesson. It was also evidenced that the majority instructors are not familiarized to form and organise groups to facilitate the application of newly learned skills in to practice and teachers' are not enthusiastic to engage students to discover new skills in their technology education classes.

The study has also confirmed that technology instructors did not try to relate their class lessons with the real and practical experience outside the class and rarely encourage them to apply their newly skill lesson to employ and apply in real practices. Some instructors did not also offered an opportunity for students for inquiry-based learning activity and thoughtful assessing activities in their technology lessons. Moreover, most instructors were rarely evaluating them through diverse evaluation techniques. It would be therefore, possible to infer that most of instructors are not aware of the modern approach of teaching technology education and could not implement the didactics of constructivism.

The findings of the study also showed that in availability of facilities, and diversity of student interest and lack of teachers training in modern techno- pedagogy found to be the major challenges in the practicality of constructivist didactics in technology education. It can be concluded that though teachers attended Pedagogical skill improvement programs, the major challenges in the utilisation of constructivist approach in teaching technology education are shortage of the required and relevant trainings and material inputs.

7. The Way Forward

These days, many developing countries including Ethiopia, have concentrated on the expansion and improvement on the quality of higher education in general and Science and technology higher education in particular. Assessing the practices, identifying and analyzing the hurdles in the effective utilization and practicability of modern approaches in the teaching–learning practice, is crucial aspect in the quality assurance of technological education so as to achieve the vision set. The constructivist pedagogy in technological education is relatively an emerging and widely accepted paradigm. Constructivist pedagogy as a teaching method aims to promote higher levels of thinking skills. Hence, teachers should be aware that learning in technological subjects should take place in authentic and real-world environments. The acquisition of technological knowledge clearly aligns with several constructionist theories of knowing. While undertaking a constructivist based activity, students gain a rich understanding of theory related to technological practice and relevant links to learning in the classroom. Technology education within the classroom needs to reflect authentic technological practice as much as is practical. Therefore pedagogical trainings and CPDT(Continuous Professional Development Teachers) programmes in the university should be designed in such a way that enable instructors not to be deficient of modern and contemporary instructional skills in technology education, but to develop aspects of learning theory relevant to technology education in the tertiary sector, which requires continuous supervision of instructional activities in the university

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