Incorporating the use of I.T Resources on Technological Courses with Active Learning Tactics

Mujthaba GM, Manjur Kolhar, Abdalla Al Ameen, Mohammed Rahmath

Abstract: One amongst innumerable deeds of Almighty is hominid due to its learning abilities. The main potential of learning is to acquire knowledge from different sources and apply it on real world applications. Learning is a technique of knowledge achievement and applying this knowledge over several application domains. This knowledge can be assimilated both by means of passive learning and active learning. Since many years traditional or passive learning played a prevailing role due to direct interaction of faculty and learner. Unfortunately these type of learning fails to attain the objectives of all the modern technological courses. This paper tries to demonstrate the learning methods like traditional and active which can conceive the outcomes of the courses as per the accreditation bodies. We also focuses on the pitfalls of traditional learning can overcomes by using active learning methods. In this paper we tried to focus on numerous active learning methods like class room observations, thinking & sharing of considerable thoughts among learners, Practical learning or achievements, brain storming, problematic based & result based learning and others. We tried to incorporate these learning methods both active & passive type to technical courses like software engineering and programming languages. The graphs are plotted after applying these learning methods on these courses. We also present a comparative study on how these active learning strategies can be beneficial in attaining the outcomes of National Qualifications Framework under National Commission for Academic Accreditations and Assessment accreditation body. This paper can be very much beneficial for all educators to select appropriate teaching strategies according to their courses before its commencement.

Keywords: Active Teaching (A.T), Traditional Teaching (T.T.), National Qualification Frameworks (N.Q.F), National Commission for Academic Accreditation and Assessment (N.C.A.A.A.)

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I. INTRODUCTION

The various qualities which exist among qualified learners like behavior, tractability, kind hearted, diplomatic, governance and multitasking abilities. Among such qualities talented & skillful training or teaching plays an important role. This role makes the educator to deliver his knowledge and gain experience to strengthen more for the said qualities as discussed in [5] [3].

The strong impact of teaching will explore the qualities of an educator on the learners. This exploration begins with improving their knowledge, class room dynamism, attentiveness towards solving the problems by various approaches, Numerical abilities, reasoning & thinking capabilities, relational & concerns, talkative and presentation skills. These skills will have direct impact on improving skills which are revealed by N.Q.F standards as per N.C.A.A.A. unit [1]. Nevertheless various learning mechanisms used extensively to achieve the mentioned qualities by means of active learning stratagems. The main objective of introducing active learning mechanism is to strengthen the educator and learner interactions instead of using unidirectional teaching by using chalk and board especially traditional mechanisms. The main drawback involved in this type of dependent teaching on educator makes the student lack of analytical & critical problem solving skills, lack of interactive nature, and lack of exposure skills towards recent developments. Many developments in the field of education demands to incorporate the technology to reinforce the passive and active learning mechanisms [4]. Span of years passes together lots of developments carried out in improving teaching and learning skills in order to meet the course outcomes. These developments direct the active learning methods which are appropriate according to the courses especially modern technological courses. In the fourth coming sessions we deal with how these active learning mechanisms fulfill in attaining the course learning outcomes in effective means. The traditional learning approaches usefulness has imperfect functionality which fails to succeed all outcomes. To overwhelmed these give & get policy the concept of active learning got introduces for the learner's point of view as discussed in [2]. An active learning method engages the learner in class room activities by involving in both passive and active methodologies [3]. Active mechanisms develop concerted skills, facing risks, develops cognitive approaches, progress perilous thinking abilities, rendezvous and involvements of the learners with educator, creating responsibilities, social interactions, participation in deliberations,

comprehensive ideas, experimental approaches and evolution of interpersonal capabilities as discussed in [1][3]. Maximum of courses associated with engineering studies, applied sciences, medical studies, technological related courses and experimental or case studies involves complete active learning strategies. In the below revealed sections we did an practical approach of applying these active learning strategies & only passive learning methods to course like programing languages and software engineering. Surprisingly we obtained the elevated graphs for active learning methods when compared with passive learning approaches.

II. LITERATURE REVIEW

Traditional teaching initiates from an awareness of the teacher and student interaction by means of memorization, self-centric, knowledge delivery and lagging in class room maintenance as stated in [12, 3, 4, and 7]. As stated by Uzma Zaidi in [1] Instructions of delivery in class room is been changing from time to time it means besides delivery by teachers and sharing their master experiences it also needed for the teachers to develop the self-efficiency and personality development skills of the learners. This self-efficiency of the leaners can be achieved by involving active learning strategies. Uzma Zaidi et al 2017 demonstrates besides class room instructions students requires inspiration, rein enforcement , continuous involvement, experiences of distinguished trainers and regular monitoring. She also emphasis on several effective learning methods and their impacts on learners to achieve maximum outcome. Huff, Savannah et al 2017 explains the merits of active learning strategies and how it overcomes the pitfalls of traditional class rooms. He also highlights to conduct the interviews among students to explore their potentiality and personality development skills. Cynthia Cummings (Lamar University, USA) et al 2017 explores the constructive teaching mechanisms which involves the students to develop their personal skills in other means they emphasizes on active learning strategies improvement and their implementations. Gittings, karen k., and ruth a. Wittmann-price et al 2016 elucidates the benefits and shortcomings of passive teaching or traditional methods which can be overcome by the benefits of active learning. Fernando, Sithara Y. J. N.; Marikar, Faiz M. M. T at el 2017 enlightens how the outcomes of the courses can be achieved by superior quality of lectures delivers under the guidance of experience peoples. Nguyen, Kevin, et al.(2016 illuminates the importance of active learning, research activities and involving completely to overcome the negative responses of students or learners. Richard J. Mueller at el (2017) describes how the trainers can be trained to deal with physiological issues and motivate the learners how to maintain their knowledge. MayZhi HongWan et al 2017 enlighten on how class room learning can have its direct impact on critical thinking. Wang, Victor CX, and Patricia Cranton et al (2017) reports various serious issues concerning to learners how to act, behave and feel in class room using technologies. These researchers also address how to implement the instructional classes. Roberts, Jonathan C., et al.(2017) clarifies how the learners creative and advanced skills can be initialized and developed. These

skills can be explored by means of active learning skills or strategies.

III. METHODOLOGY

In the proposed methodology we tried to integrate active learning mechanisms in to modern technological courses in order to achieve maximum outcomes. Over the past decades the passive learning alone could not able to achieve the maximum outcomes of the applied technological courses and other applied sciences courses. The courses which contain knowledge, use of technologies, class room discussions, case studies, experimental learning, projects implementations, research activities and advance theories.

The case study focused in this paper is aim to promote Quality Education at university level. We tried to identify or selection of appropriate National Qualification Framework (NQF) skills which improves and promotes Quality Education especially for all modern technological courses. These NQF skills are mentioned by N.C.A..A.A. standards. These standards are followed by most Saudi Arabian Universities among such that Prince Sattam Bin Abdu-Aziz University (PSAU) situated at Riyadh region (K.S.A.). In this paper we collected the data from the Computer Science Department, College of Arts & Science situated at Wadi Ada Dawaser affiliated to Prince Sattam Bin Abdul-Aziz University (PSAU). The Department offers with a proper mission and vision to graduate the students to compete modern technological world.

IV. LEARNING STRATEGIES

Traditional teaching methods is known students and educator interaction by means of learn through memorization and reading practices but fails to improve their intellectual skills as come up in [4]. These traditional methods highlighting on interaction from teacher to student only but fail from student to teacher. Due to this drawback only pay attention skills only improved with in the learners. Journal of Curriculum and Teaching provided a comprehensive revision of accomplishments with in the class room like learning by practical approaches, class room engagement, query & reply, quizzes, developing & understanding case studies and practical exposure as discussed in [5]. To satisfy these parameters we need active learning mechanisms as discussed in [2] and [5].Rising mandate of technological courses needs to acquire the knowledge by various means like active and passive learning modes [2]. In the subsequent sections we emphasis on how learning outcomes or objectives can be attained by using active learning methods much better when compared with passive learning methods. We tried to implement these both learning methods on courses like programming languages and software engineering courses. The main aim of active learning strategy is to engage the learner and student with cooperating environment as discussed in [2]. Emphasis on class room activities like representation of the data, group discussions and class room outside activities like developing self-learning abilities and personality development skills as said in [3].

Since past eras research continues to till date proves how the A.T is much effective when compared with P.T as said by [1][7]. The vital component in A.T is to gain the maximum objectives of the technological courses and applied science courses. Suitable selection of A.T strategies to increase the outcomes of the courses is much important. Small attempt is made to select suitable A.T strategies and applied on software engineering and programming languages. Each A.T strategy contribute to gain the outcomes of the courses like knowledge, cognitive, interpersonal, responsibility, numerical and psychomotor skills as per N.Q.F of N.C.A.A.A.

A. Case Study for the College of Arts and Science, Department of Computer Science, Wadi -Al Dawaser (Kingdom of Saudi Arabia)

The case study focused in this paper is aim to promote Quality Education at university level. We tried to identify or selection of appropriate National Qualification Framework (NQF) skills which improves and promotes Quality Education especially for all modern technological courses. These NQF skills are mentioned by N.C.A.A.A unit. These standards are followed by most Saudi Arabian Universities among such that Prince Sattam Bin Abdu-Aziz University (PSAU) situated at Riyadh region (K.S.A.). In this paper we collected the data from the computer science department, College of Arts & Science situated at Wadi Ada Dawaser affiliated to PSAU. The Department offers with a proper mission and vision to graduate the students to compete modern technological world.

B. Process of Quality assessment within the college

Quality Assessment plays a major role in student's growth and initiated from the benign of Department. Quality team works along with coordination of Department in order to implement and verify various assessment methods. As per NCAAA, numerous standards have been prescribed to improve students' NQF skills as mentioned in figure 2.1. To improve student standards the department is very keen in implementing all NQF skills for all of its courses among such courses Computer Programming and Software Engineering also exists. Applying these skills on these modern courses needs proper assessment methods. The complete mechanism of Quality which assesses the courses is shown in below fig 2.1
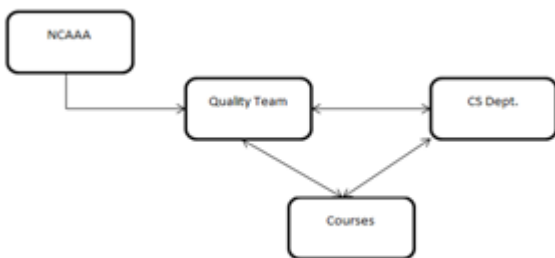

Fig. 1 Course Assessments between Department and Quality Team

As shown in the above fig.1 assessment of each course will be done by Department and Quality team. Department is responsible for designing & planning the course, providing classroom with smart technologies, conducting classes &

labs, scheduling for exams, displaying results and so on. Whereas the Quality team is responsible for following standards in order ensure Quality educations, to meet vision and mission of Department, periodical checkup to ensure course outcomes & objectives, selection of appropriate assessment methods, covering all NQF Domains & Standards , providing job opportunities , collecting Student & Course Evaluations and so on.

C. Members

To ensure Quality Education & Assessment methods we collected the data with the Department students and faculties. After gathering data our job is to plot the graphs between Traditional & Active Learning mechanisms.

D. Active teaching methods experiment on courses

Various A.T methods had prescribed by the researchers to gain the maximum outcome. It is up to the educator to select the appropriate A.T methods according to their courses. For courses like programming languages and software engineering we had applied selected and applied A.T methods which gains more outcomes of that courses when compared with T.T methods as listed in [1][6][7]an[12]. Various A.T approaches planned which are itemized in the beneath table I. Active Learning involves the students directly to learn by themselves rather than following to someone else. It mainly focuses on learner and learning activities carried inside & outside of the class. It develops the skills according to NCAAA which are listed in the below table 2.2

Table I. Mapping the NQF Learning Domains

NQF Learning Domain	Active Learning Strategies	Outcome
Knowledge Skills	Perception Learning, Shared Brainstorming PBL & SBL and Passive Learning	Acquire and presentation of knowledge
Cognitive Skills	Thinking & Reasoning , PBL & SBL and Class room activities	Proper planning, Doing analysis, Involve in problem solving approaches by higher degree of thinking
Interpersonal & Responsibility Skills	Class room activities, Think, Pair & share and assignments.	Motivate to hard & smart work and Develop ability to work with team
Communication, Information Technology and numerical skills	Class room activities , Accessing IT resources Think , Pair & share and so on	Adequate with Learning Recourses ,Adopting new learning approaches
Psychomotor Skills	Experimental Learning Case studies and projects	Experiments, Implementations, Projects, case studies and so on.

Appropriateness of A.T. strategies with Intended Learning outcomes is an important issue. Following above table I are the outcomes which come from Active Learning Strategies and helpful in preparation of survey guidelines. Following below points are considered under survey among students carried out to the see the impact of A.T. plans rummage-sale for courses like programming languages and Software engineering

E. Perception learning

As stated in [8][13] survey is conducted in the campus to ensure perception learning. Based on the survey carried out for perception learning among students the following below are the results generated in the below fig 2
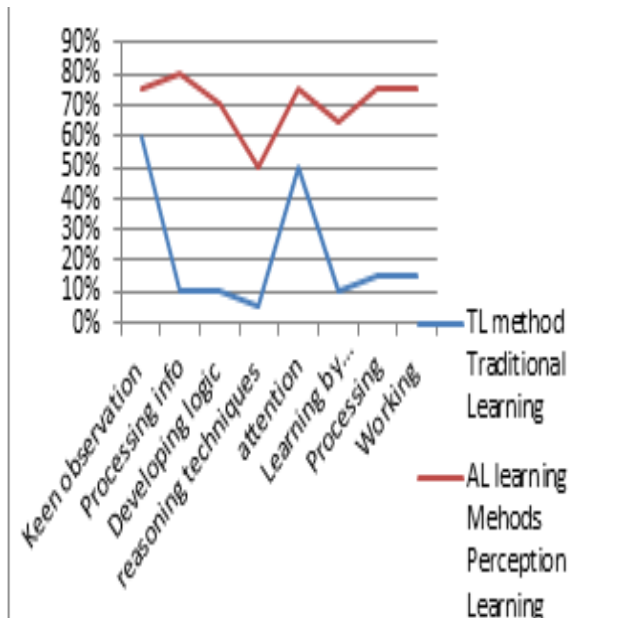

Fig.2 Perception Learning on Programing Languages and Software engineering

Comments on Perceptron Learning

- Demonstration & Understanding underneath concepts of programming & software engineering working with exercise programs or examples
- Keen observation pictorial representations like flowcharts, modeling diagrams and so on
- Processing info. gathered
- Developing logic for various programming constructs
- Encouraging reasoning techniques used for searching and sorting
- Maintaining attention
- Learning through environment
- Working with save data
- Processing audio data &video data

F. Thinking & reasoning

As stated in paper [9][13] thinning and reasoning technique is applied on the students ,based on the survey carried out for thinking & reasoning among students the following below are the results generated in the below fig 2.4
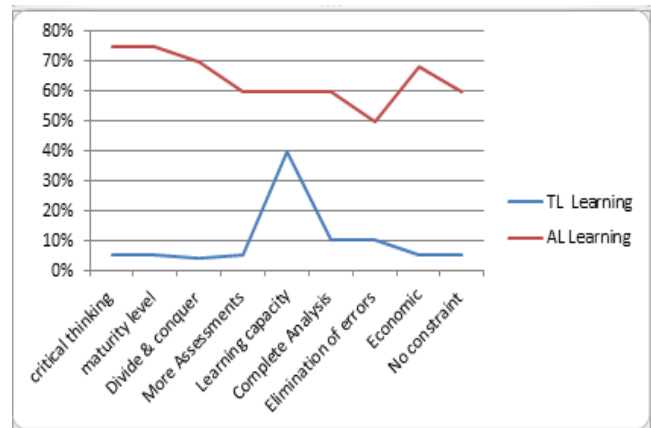

Fig 3. Thinking & Reasoning

Comments on Thinking and Reasoning

- Emphasis on critical thinking within a student
- Develops student maturity level
- Inherit Divide & conquer strategy within students
- More Assessments can be done
- Improves Learning capacity
- Complete Analysis on various problem solving approaches
- Elimination of errors by more thinking
- Economic due to before implementations
- No constraint of finite analysis
- Guidance by experts

G. Class room Discussions

Based on the survey [13] carried out for thinking & reasoning among students the following below are the results generated in the below fig 2.5
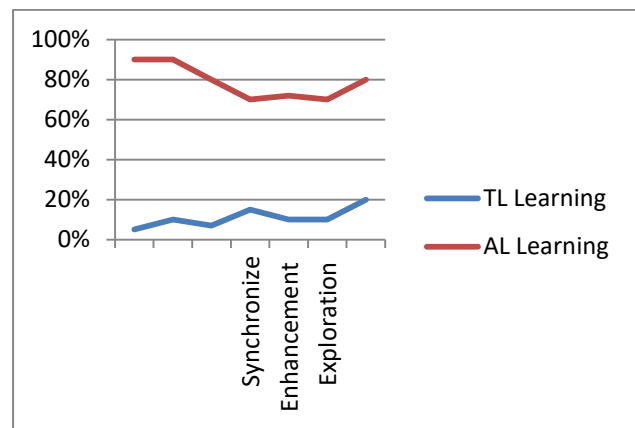

Fig 4 T. Comparison with A.T. i.e. Class room Discussions

Comments on Class room discussions

- Forms Interactive environment between instructors and students
- Encourages learning ability with in students

- Originate, create, and clarify student's doubts
- Synchronize slow learners with completive learners
- Enhancement of student thoughts to innovate new
- Exploration of various ideas to apply
- Acceptance on laggings of students and finding various ways to cope up.

H. Think Pair and share

Based on the survey carried out for think, pair and share among students the following below are the results generated in the below fig 2.6 [3]

Comments on Think pair and share

- Creates Cooperative environment to meet technical challenges

- Develops Interpersonal skills within the students to take care of projects

- Improves communications skills between teacher-students and students-students

- Advances searching habit through internet which improves IT skills

- Time management skills will be developed

- Self-Learning ability will be improved with in students

- Presentation by students leads their personality development

- Group participation will lead to improve leadership Qualities

- In cultivate habit to act professional in dealing professional situations, ethical standards and so on.
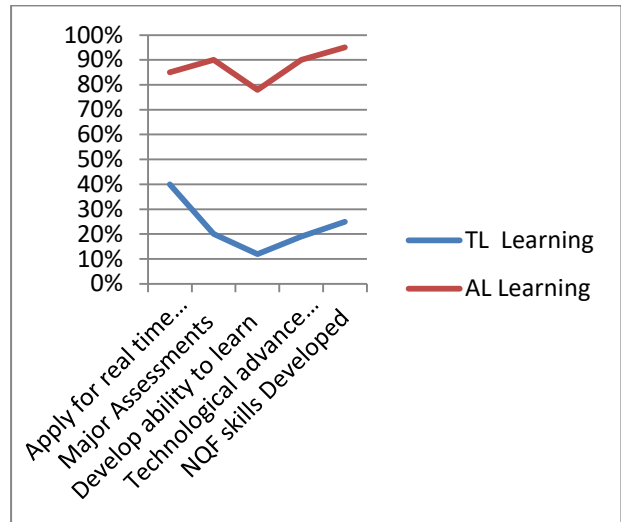

Fig. 5.TT. Comparison with A.T i.e. Think pair & Share

I. Problem based and Solution based learning

Based on the survey [13] carried out for PBL & SBL and share among students the following below are the results generated in the below fig 2.7

Fig 6 T.T. Comparison with A.T and P.BL. & S.B.L.

Comments on P.B.L and S.B.L

- Both PBL and SBL can be used to apply for real time projects
- Major Assessments can be done like case studies, carrying projects, searching advance topics, Presentations and so on.
- Used to develop ability to learn things by doing and apply to real time.
- Mostly suitable for modern technological advance courses.
- All National Qualification Frame work (NQF) skills like knowledge, Cognitive, Interpersonal and Numerical & IT skills will be developed
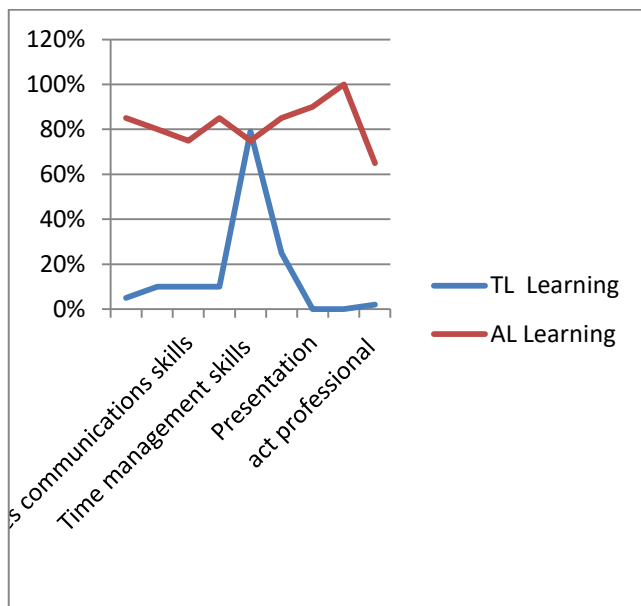
J. Shared brainstorming

Based on the survey carried out for brain storming among students the following below are the results generated in the below fig 2.8 as stated [10,13]
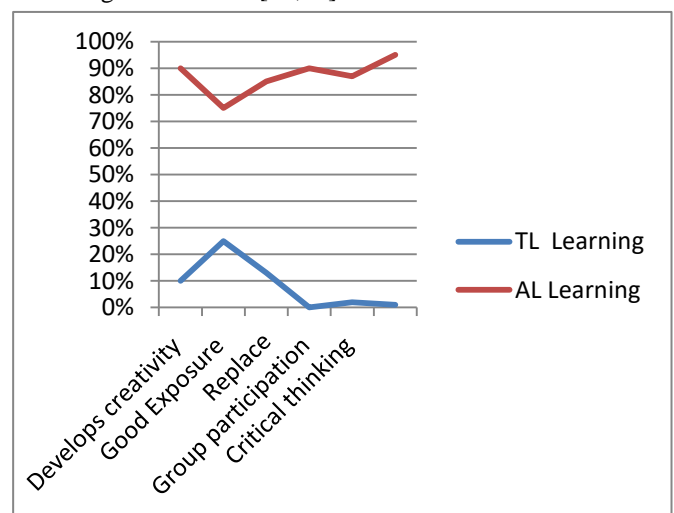

Fig.7 Brainstorming

Comments on shared brainstorming

- Develops creativity within a group
- Good Exposure with new ideas
- Replace past ideas with derived ideas if it is good.
- Group participation makes Interpersonal & presentation skills , Analytical skills and creative
- Critical thinking will be developed.
- Group and Individual concern with all students

K. Experimental Learning:

Based on the survey carried out for experimental learning among students the following below are the results generated in the below fig 2.9 as observed in [11]
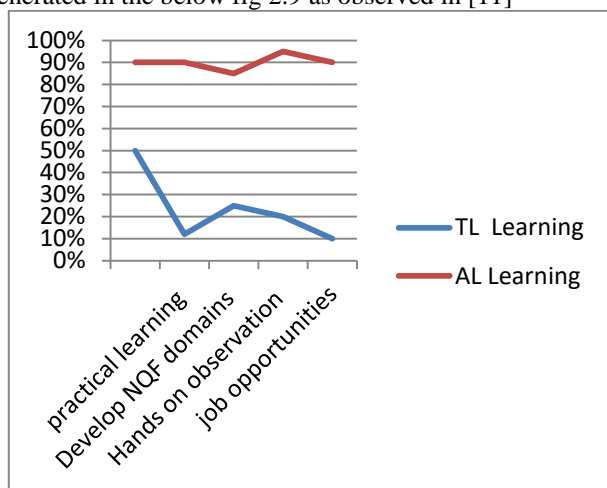

Fig. 8 Experimental Approaches with T.T

Comments on Experimental Learning

- Student-Centered practical learning to strengthen practical approach
- Day to Day practical learning leads rapid growth in technology and research
- Develop NQF domains like knowledge, practical and cognitive skills
- Hands on observation to implement acquired knowledge

V.   RESULTS AND DISUCSSION

The students and educators are asked to take part in survey to state how A.T can be beneficial over T.T methods. These surveys had carried out few learning approaches of A.T on courses like software engineering and programming languages. The skills which involved in A.T strategies defined to be more advantageous when compared with T.T methods. So these beneficial methods succeed more outcomes of the courses which is useful to the students and educators both. Obtained outcomes will satisfy the skills as mentioned under N.Q.F of N.C.A.A.A. standards. As there is no much considerable work conceded in the field of A.T plans it is recommended for the educators to follow the appropriate A.T strategies and fulfill the maximum outcomes of the courses. These outcomes not only satisfy to fulfill the outcomes of the course but also program learning outcomes of the institution and accreditation bodies with which it is associated.   Keeping in view to their skills, an assessment method, outcomes, institutional police & plans and quality supremacy it is recommended to select suitable learning methods which is favorable and constructive in all the means. This paper also aims to correct the draw backs of existing A.T methods by applying on more number of courses and re develop those A.T methods. It is also recommended for the institutions to make proper use of technological resources for the courses to be applying A.T strategies.

VI.   CONCLUSION

Teaching and Learning always to be prevailing on technological courses to grow cognitive skills and problem solving approaches within a student. This paper mainly focusses on Traditional Learning strategies or methods which fail to fulfill present era i.e. technological courses outcomes namely programming paradigm and software engineering. We collected statistical data for the above courses using. Each of these above A.T learning parameter of AL will achieve outcomes of modern technological courses when compared against TT.. The future work will educate the teachers to apply appropriate AT learning methods while suits the technological & research courses in order to achieve all N.Q.F domains. This paper summarizes that T.T is good for the courses with memorization or understanding but it fails to achieve the maximum outcomes of the courses for which it is intended. So research being carried in this paper will demonstrate to incorporate active learning methods along with traditional methods in order to gain the maximum outcomes.

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