

A Critical Study on Effectiveness of ICT based Education in Polytechnic Colleges of Madhya Pradesh

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Abstract: The requirement of technology tools in polytechnic colleges alone will not satisfy the quest for ICT education and training among teachers and students; rather, it must be associated with strong teaching and learning process support in order for instructors and learners to heavily incorporate technology into the teaching learning process. This study is conducted keeping in mind the same objective. Survey was conducted at three level having 3 questionnaires for Administration, teachers and students on Polytechnic colleges of Madhya Pradesh. Three hundred thirty (330) students and 102 teachers participated in the survey. The findings of the study discovered that the availability and integration of innovative ICT resources in polytechnic laboratories are at a meaningful level, which may improve the status and performance of learning from both teachers and students' perspectives. It also concludes that the availability and implementation of various ICT resources in the laboratories of polytechnic colleges are at significant level so that may enhance the status and performance of learning from both the side teachers and students. It can be further researched by considering other parameters that can be implemented in classrooms for the better teaching and learning process.

Keywords: Information and Communication Technology, polytechnic education, Education Sector, Hypothesis

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I. Introduction

The massive growth of social connections, along with technological developments in the contemporary age, has significantly altered the way students are taught. All people who participated in the training method must now identify the business direction of children's learning if learning and society are to have a future [1]. Information and communication technology (ICT) has long been a valuable part of education. In the 1920s, Sidney L. Presses created a fully automated measurement device, ushering in the usage of innovation in evaluation [2], [3]. Additionally, schools began to use standardized evaluation and computerized scoring advanced technologies at the very same time, making large-scale checking more appropriate and cost-effective [2], [3].

Information and communication technology (ICT) has developed into critical tools that have changed how people think and act and end up living. There really is no denying the relevance of ICTs in today's modern educational psychology. Modern day-to-day businesses dependent on mobile handsets, faxes, as well as computer communications networks to run and help them. Modern e-commerce, electronic-government, electronic-machine, electronic-banking, and electronic-education are all examples of this trend [6]. As component of the ICT revolution, computer systems, the Online world, and other mobile communications methodologies have been used in all areas of human endeavor. ICT also includes data management and preparation for use on computer and communications technology such as laptops, camera systems, and smart phones.

In this respect, the administration and other genuine organizations take necessary corrective action. Despite government measures, the performance of technological education in the country has deteriorated, resulting in a drop in college wanting to pursue these course work. This is shown in the fact that millions of seat backs continue to stay unfilled, resulting in a lower enrollment ratio. Another component of decline in the quality might be the involves high growth in the number of technical colleges. Furthermore, teenagers from all these organizations are not equipped to satisfy the initial industry prerequisite standards. As a result, quality improvement emerges as an effective tool for dealing with such issues.

Because institutions cannot manage to take appropriate action against all offenders, doing so will not help address roots of the problem associated with quality. As a result, it is necessary to priorities these factors and, as a result, take action in light of their significance [9]. The successful implementation of continuous improvement factors in Indian polytechnic learning institutions would enhance educational standards. The improvement of polytechnic education may provide students with the necessary skills and intelligence to support them find work in today's market.

In any system, the performance of teachers determines the educational quality. The multiple National Institutes of Technical Teachers' Training and Research (NITTTRs) are independent establishments underneath the Ministry of Education (MoE), Govt. of India, that train educators in India's engineering college and polytechnics [2]. They are committed to quality improvement of technical education system in the country.

Each NITTTR annually trains around 4-5 thousand technical teachers through contact mode as per annual reports (2018-19 and 2019-20) available on their websites. The percentage of engineering and polytechnic institutes in the nation has increased significantly over the last 2 decades. In recent past, each NITTTR successfully offering courses in both blended and online modes to train pre-service and in-service educators on predefined course outcome that indicates the potential of using Information and Communications based technologies.

A-VIEW (Amrita Virtual Interactive E-learning World) [2]- The Versatile E-Learning Tool for Distance Education developed by Amrita University, IIT Mumbai with the help of the Minister of state of Human Resource Development, Government of India [10] and Learning Management System (LMS)-MOODLE [11] are used at NITTTR, Bhopal.

The Ministry of Government of India's Directorate General of Employment and Training (DGE&T)[3] has used the aforementioned expert knowledge to organise their pilot project of having trained ITI capabilities via NITTTR's Information & Communication Technology (ICT)/AVIEW hub and Remote Centre (RC) or spokes locations across the world.

1.1 Objectives of the study

- To find out the status of use of ICT in classrooms of polytechnics in state of M.P.
- To identify problems faced by teachers and students in the use of ICT based learning.
- To compare among effectiveness of autonomous and government college in terms of ICT based education.

II. LITERATURE REVIEW

Bujang et al. [1] The sudden increase of the Industrial Revolution 4.0 has motivated Malaysian academic institutions to make adjustments the contemporary schooling system to the prospective quality education 4.0. The impact of IR 4.0 on Malaysian academic institutions has opened a new era, needing all faculty members to be capable of utilizing ICT in their teaching and learning. Selecting appropriate online learning software and processes to teach students in self-paced studying is, however, a challenge. The purpose of this research was to look into the growth of online instructional tools and platforms predicated on Polytechnic Malaysia students' needs. The questionnaire was undertaken at irregular intervals between many 320 applicants from various polytechnics and academic fields. This research uses a quantitative approach, with survey questions as the analysis tool. On comparing to certain other training technologies and networks, e-learning systems were discovered to become the most famous between many students in their questionnaire. As a direct consequence, the results of the study may be used as a designed to help Malaysian Polytechnic teachers in improving their online learning utilization and developing digital currencies in designed to facilitate education 4.0 in the coming years.

Ugwuoke et al [2] investigated the usage of information and communication technology (ICT) in the specialist success of learners in Enugu state's higher education institutions. The study was intended to be a detailed examination. Five survey questionnaires and 2 null hypotheses directed the research. The survey had a sum of 123 participants. The sampling size of 123 people involved was used in the study. As a result, there was no sampling. A series of questions were used to collect information. Percentage based scores were used to analyze the questionnaire method. Mean and standard deviation were used to solve the research questions 2-5, whereas t-test statistics were used to compare the two null hypotheses. Desktop computers, laptop type computers, notebook based computers, tablet based computers, whiteboards, memory sticks, CD-ROM/WR, word processor bundles, and PowerPoint presentation bundles, along with other ICT hardware, are relevant for continuous learning in higher education institutions in Enugu State, according to the existing report's results. ICT is integrated into the curriculum of continuous education higher education students in Enugu State in a variety of ways, including use of a data projection screen in class, PowerPoint to show information throughout school, and etc. The scarcity of desktop computers, laptops, and notebook type computers, as well as implementation and utility programs and a computer monitor, are all obstacles to ICT integration in the classroom. In aspects of the hypotheses, there is no significant significant gender difference adult learning educators' average scores of the quantity of ICT integration into guidance and the barriers to ICT integration in Enugu State institutions of higher learning. The original study concepts and theories for Adult Learning were highlighted. It was recommended that the federal and state governments provide sufficient funding for colleges and universities in Enugu State so that ICT can be bought and intimately linked into adult learning educators' curricula.

The availability and use of World wide web libraries by educationalists at a few polytechnics in Nigeria's Ogun State was investigated by John et al [2]. This study adopted a survey research series of questions as part of a complete research strategy. The original study sample includes all educators from Federal Polytechnic, Ilaro, MoshoodAbiola Polytechnic, and Gateway Polytechnic in Ogun State. Due to the obvious large sample-size, random sampling technique will be used to select 155 folks from the 548 who would have been probed. The study utilized a table, a frequency distribution, and a fundamental proportion to analyse the data. The research reveals that polytechnics have World wide web library and information services, with connectivity to OPAC/WEBPAC, electronic-journals, e-mails, and internet based current awareness services in the library is perhaps the most frequently used Internet-based library investments by instructors. The worktop also revealed that polytechnic educators in Ogun State do not use the library's world wide web infrastructure for academic purposes or to undertake live instructional videos with students.

The obstacles to effective ICT knowledge in Office Technology and Management programmes were identified by Nwanewezi et al [3]. In this study, the questionnaire survey was employed. The study's participants comprised of thirty-one faculty members from OTM different department at numerous polytechnics in Niger State. The sample population consisted of twenty-six individuals, and the probability sampling was random sampling technique. The data was gathered using a five-point rating scale online survey. Whereas instructors in Office Technology and Management had been legitimately and cognitively capable of teaching ICT college courses, the analysis revealed that they lacked sufficient re - training to provide ICT project assignment to their students effectively. It also called attention to a complete absence of Infrastructural development, inadequate condition, frequent power outages, an absence of multi-media educational materials, and the use of ineffective teaching methods. At OTM, a number of issues were revealed that were adversely affecting the successful teaching of ICT curriculum work. It was recommended that the government & polytechnic officials provide sufficient funding to OTM different department so that they can provide the required management and facilities developing skills to satisfactorily teach ICT programmes.

Kabir et al. [4] presented an integrated approach to international problems related to ICT implementation in schools. Due to the obvious investigation of the school environment and the evaluate of the documentation, that were used as explanatory ways of developing improves performance and trying to draw a reasonable assessment, the investigation is more practical. The research would assist in the discovering of variables impacting teachers' choices to integrate ICT into their classroom instruction, it was revealed. This would be undertaken to examine various barriers to ICT usage that are connected to current studies.

Babate et al [5] discovered a few publications that discuss significant obstacles to ICT integration and use in academic achievement. Teachers expressed a strong desire to use Technology in classroom, but they encountered problems such as a trust issues, expert knowledge, and tech assistance for current and innovative ICT tools, according to the findings. In overcoming these clearly delineated hurdles, schools and universities should have performance improvement instruction as well as allocation of tasks a well-trained tech support team. On the other side, providing all appropriate ICT assistance enhances the strength of excellent Integrating technology and usage. The research concluded with some well-established recommendations that, if applied, might also serve as a catalyst for Integrating ICT in Nigerian colleges of education in the north-east.

Petinrin et al [6] mentioned some of the most significant challenges that Nigerian polytechnic training confronts, as well as possible alternatives for economic progress. This was also suggested that polytechnic students be given the right environment in which to research and make some effort to contribute to the nation's economy and growth. Finally, the suggested that the government build support for polytechnic teaching and learning in attempt to face the polytechnic system's poor national infrastructure.

Ehsan et al. [7] In providing better academic achievement and prepare lifelong learners in the twenty-first couple of centuries, governments worldwide have made considerable efforts to integrate ICT into teaching approach. However, incorporating Teaching and learning to improve educational standards is a difficult task. To successfully implement ICT into teaching and learning activities, academic institutions must first assess the current state of ICT as well as the barriers that obstruct the process of ICT integration. The author decided Kabul Polytechnic University as a case study location. Officials, educators, and students provided details through questionnaire items and structured discussions, as well as exploratory and descriptive research methodologies. The study discovered that instructors had ordinary access to ICT services, whereas applicants had limited access. The results also showed that ICT tools were only used in a limited number of teaching and learning practices, and that their knowledge of ICT was either basic or minimal. Inside the case research topic, the results also perceived barriers to ICT integration into education - learning conversations, including a lack of facilities, reliable power supply, technical support, educators' negative attitudes toward ICT, and instructor time limits.

III. RESEARCH DESIGN

This study adopted a description survey qualitative research that is worried with the current state of connections, in which the research scientist does not deceive the different factors but rather observes and reports on how things are (Best & Kahn, 2003; Joseph, 2013). Data was gathered through a questionnaire created by a researcher. According to Johnson in his book, the most suitable technique is a set of questions (Johnson & Christensen, 2008). It enables participants to quickly choose the option that best reflects their outsider's perspective.

Steps have been taken in a chronological step to accomplish the optimum result are depicted in the flowchart below fig 1. The data analysis steps are organized in such a way that the first one comes first. Data is gathered using a Google form-based questioner. For each of the three main categories, a reaction sheet is created in the form of a worksheet. MS-Excel is used to properly assess the Chi-square test. SPSS software is used to verify the Chi-square test results. The values were compared in order to conduct hypotheses. The hypothesis is either rejected or accepted. The research's results and observations are then introduced.

With an in investigation begins with a thorough examination of the helpfulness of digitalization (ICT) helped facilitate learning for improving academic performance of students involved, the scholar pursued the very next study objectives.

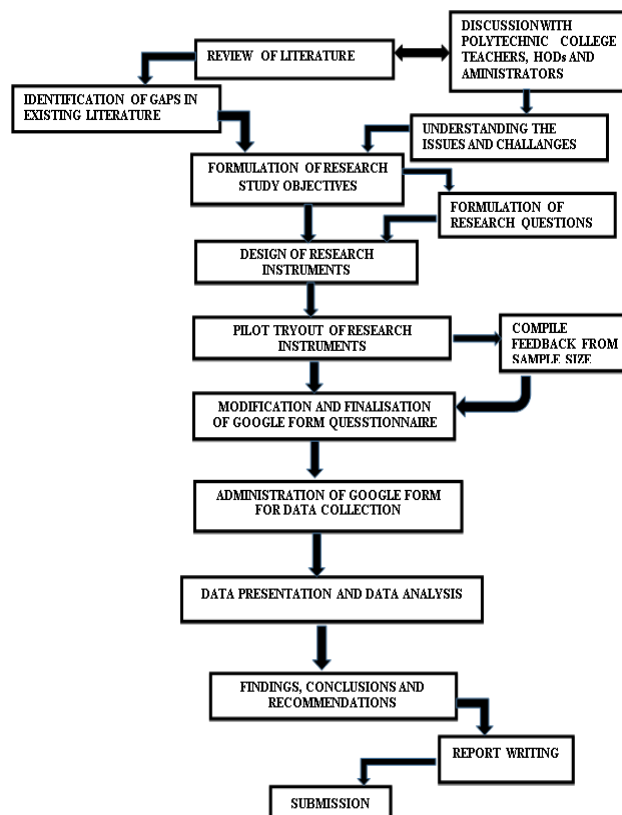


Figure 1 Broad Framework of the design of the research study.

The participants of this research included all polytechnic college instructors and polytechnic schoolchildren of all branch offices derived from all polytechnic colleges (government, personal, and independent) in Madhya Pradesh, India, with a focus on Bhopal. Since it is a common belief among people, particularly in India, that high-end private entities serve their educators best in terms of pragmatic and application, the goal of having such a large population is to provide equal opportunities and to produce results in a fair manner. The survey received a reply from polytechnic universities of all types.

IV. RESEARCH QUESTIONS

1. What is the status of labs available in Polytechnic colleges for imparting ICT education?
2. How does ICT affect the education scenario for teachers and students in polytechnic colleges of Madhya Pradesh?
3. How effectively ICT tools and systems have been implemented in polytechnics?
4. What quality of content is utilized in ICT tools for polytechnic colleges and how does it affect the budget of the colleges?

4.1 Sample and Sampling technique

A survey's total responses are referred to as the population, and one of the most important tasks is to select a sample for evaluation from the population. Sampling refers to the techniques and methods used to complete this task. Sampling techniques are divided into two categories: (1) Probability based sampling. (2) Non-probability based sampling. To make data gathering easier, non-random selections are made convenient accessibility or other variables.

In regards to the Survey being distributed to the general public, 330 students and 102 educators have decided to revert. The data is sampled using a simple random selection method and the chi square to determine the values. Staff members, both male and female, as well as students, make up the population. The convenient sampling is used in this study. The reason for choosing this method is that it provides equality of opportunity to all participants who are chosen for the evaluation, leading to more effective and analysis is supported.

4.2 Sample Details

TABLE-1 POPULATION DETAILS			
TYPE OF INSTITUTE	TEACHERS		STUDENTS
	No. of colleges	Response received	Response received
Government Polytechnic college	49	86	262
Autonomous Polytechnic college	10	14	62
Private Polytechnic college	2	2	6
TOTAL		102	330

Above Table-1 is elaborating the details of sample which is been considered for this study.

4.3 Chi-Square Test

Chi-square tests are divided into two categories. For multiple reasons, both use the chi-square statistic and allocation:

- A chi-square normality test is used to ascertain if sample data is representative of the population.
- In a contingency table, a chi-square test for autonomy combines different variables to see if they are related. In a broader sense, it examines whether categorical distributions differ from one another.

In this study, the second form of the Chi square is taken into account.

The formula for the chi-square statistic used in the chi square test is:

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

V. FINDINGS

Under different objective of the study, When the chi-square test was applied, it following result which is stated in table-2.

TABLE-2 CHI-TEST RESULTS UNDER DIFFERENT OBJECTIVES					
S. NO	Title of Statement	Associated Hypothesis	Chi-test Value	Critical value	Null Hypothesis Result
1.	Status of lab	Availability/Non-availability of proper lab with proper tools is not essential for effectiveness of ICT.	257.55	47.399	Rejected
2	Budget of ICT	Availability/Non-availability of Budget in colleges has no relation with enhancement of ICT.	15.198	9.488	Rejected
3.	Teacher's perspective	Acceptance/Non-acceptance of changes related to ICT based tools by teacher is not essential.	308.1	119.87	Rejected

1. For the first entry in table-1 under title "Status of Lab", since the Chi-test value is higher than critical value therefore we are failed to accept the null hypothesis and hence conclude that for the effectiveness of ICT in polytechnic colleges it is necessary to have proper lab and colleges have enough resources for it.

2. For the second entry in table-1 under title “Budget of ICT”, since the Chi-test value is higher than critical value therefore we are failed to accept the null hypothesis and hence conclude that budget is significant for the implementation of proper lab.

3. For the third entry in table-1 under title “Student’s perspective”, since the Chi-test value is higher than critical value therefore we are failed to accept the null hypothesis and hence conclude that sufficient number of system and resources are must for student’s enhancement.

4. For the above analysis stated in Table-2, frequencies of responses has been taken is given under Table - 3, 4 and 5 for Lab status, Budget and Teacher’s perspective respectively.

Table 3 Parameters for analyzing hypothesis of Lab status

ASPECTS OF LAB STATUS STATEMENT	YES		NO		WEIGHTED AVERAGE
	F	%	F	%	
A-1. Computer Lab Availability (CSE/IT)	94	92.16	8	7.85	1.922
A-1. Computer Lab Availability (Others)	84	82.36	18	17.65	1.824
A-2. Adequate number of Computer Laptops(CSE/IT)	86	84.32	16	15.69	1.843
A-2. Adequate number of Computer Laptops(Others)	78	76.48	24	23.53	1.765
A-3. Computer lab accessibility for Teachers(CSE/IT)	94	92.16	8	7.85	1.922
A-3. Computer lab accessibility for Teachers(Others)	92	90.2	10	9.81	1.902
A-4. Adequate ICT related resources namely Printer, Scanner(CSE/IT)	84	82.36	18	17.65	1.824
A-4. Adequate ICT related resources namely Printer, Scanner(Others)	86	84.32	16	15.69	1.843
A-5. Computer lab accessibility for Students(CSE/IT)	94	92.16	8	7.85	1.922
A-5. Computer lab accessibility for Students (Others)	92	90.2	10	9.81	1.902
A-6. Reliable and speedy Internet Connectivity(CSE/IT)	76	74.51	26	25.5	1.745
A-6. Reliable and speedy Internet Connectivity(Others)	72	70.59	30	29.42	1.706
A-7. Internet access for Teachers(CSE/IT)	90	88.24	12	11.77	1.882
A-7. Internet access for Teachers(Others)	88	86.28	14	13.73	1.863
A-8. Internet access for Students(CSE/IT)	82	80.4	20	19.61	1.804
A-8. Internet access for Students(Others)	80	78.44	22	21.57	1.784
A-9. Video/Teleconferencing availability(CSE/IT)	66	64.71	36	35.3	1.647
A-9. Video/Teleconferencing availability(Others)	60	58.83	42	41.18	1.588
A-10. Virtual classroom availability(CSE/IT)	72	70.59	30	29.42	1.706
A-10. Virtual classroom availability(Others)	64	62.75	38	37.26	1.627
A-11. Tablets PC/Laptops for Teachers	80	78.44	22	21.57	1.784
A-12. Tablets PC/Laptops for Students	48	47.06	54	52.95	1.471
A-13. Provision for online courses for Teachers	84	82.36	18	17.65	1.824
A-14. Provision for online courses for Students	68	66.67	34	33.34	1.667
A-15. Availability of online educational videos. (CSE/IT)	86	84.32	16	15.69	1.843
A-15. Availability of online educational videos. (Others)	84	82.36	18	17.65	1.824
A-16. Availability of online access of research papers for teachers. (CSE/IT)	66	64.71	36	35.3	1.647
A-16. Availability of online access of research papers for teachers. (Others)	60	58.83	42	41.18	1.588
A-17. Availability of online access of research papers for students. (CSE/IT)	54	52.95	48	47.06	1.529
A-17. Availability of online access of research papers for students. (Others)	40	39.22	62	60.79	1.392

Table 4 Parameter for analyzing hypothesis of Budget for ICT Tools

BUDGET ASPECT STATEMENTS	YES		NO		WEIGHTED AVERAGE
	F	%	F	%	
B-1. Budget Available for ICTbasedtools and techniques. (CSE/IT)	68	66.67	34	33.34	1.667
B-1. Budget Available for ICTbasedtools and techniques. (Others)	54	52.95	48	47.06	1.529
B-2. Budget Available for ICTPromotion in Institute	32	31.38	70	68.63	1.314
B-3. Budget for online research paper access(CSE/IT)	54	52.95	48	47.06	1.529
B-3. Budget for online research paper access(Others)	70	68.63	32	31.38	1.686

Table 5 Parameters for analyzing hypothesis of teacher’s perspective

TEACHER'S PERSPECTIVE STATEMENTS	YES		NO		WEIGHTED AVERAGE
	F	%	F	%	
D-1. Curriculum includes use of IT(CSE/IT)	92	90.2	10	9.81	1.902
D-2. Has Change in Teacher role been accepted by faculty(CSE/IT)	86	84.32	16	15.69	1.843
D-2. Has Change in Teacher role been accepted by faculty(Others)	94	92.16	8	7.85	1.922
D-3. Faculty use Educational Theories in Teaching-Learning process(CSE/IT)	92	90.2	10	9.81	1.902
D-3. Faculty use Educational Theories in Teaching-Learning process(Others)	76	74.51	26	25.5	1.745
D-4. Are Teachers Interested in ICT(CSE/IT)	72	70.59	30	29.42	1.706
D-4. Are Teachers Interested in ICT(Others)	90	88.24	12	11.77	1.882
D-5. Are Teachers willing to use ICT(CSE/IT)	88	86.28	14	13.73	1.863
D-5. Are Teachers willing to use ICT(Others)	82	80.4	20	19.61	1.804
D-6. Has accessibility to ICT equipment been ensured(CSE/IT)	80	78.44	22	21.57	1.784
D-6. Has accessibility to ICT equipment been ensured(Others)	60	58.83	42	41.18	1.588
D-7. Are Teachers capable of handling computers? (CSE/IT)	66	64.71	36	35.3	1.647
D-7. Are Teachers capable of handling computers? (Others)	60	58.83	42	41.18	1.588
D-8. Are Teachers capable of using software?(CSE/IT)	62	60.79	40	39.22	1.608
D-8. Are Teachers capable of using software?(Others)	80	78.44	22	21.57	1.784
D-9. Is there Data Storage facility(CSE/IT)	76	74.51	26	25.5	1.745
D-9. Is there Data Storage facility(Others)	48	47.06	54	52.95	1.471
D-10. Teachers are given adequate time for ICT D-Preparation(CSE/IT)	48	47.06	54	52.95	1.471
D-10. Teachers are given adequate time for ICT Preparation(Others)	84	82.36	18	17.65	1.824

The study was further done in the direction of comparative analysis on various aspects of using ICT in Autonomous colleges with respect to Government colleges as given in Figure 2.

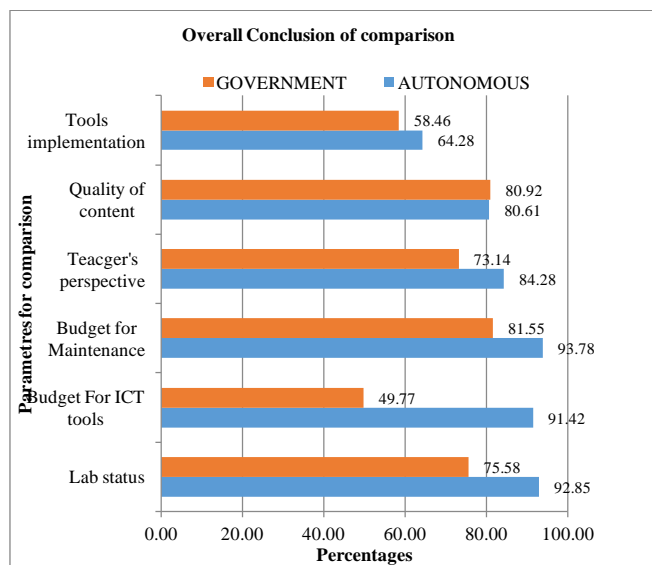


Figure 2 Comparison between Autonomous and Polytechnic colleges

The findings reveal that Overall 84.28 percent of autonomous colleges are in support of ICT and are effectively implementing curriculum content through ICT based education whereas 73.14 percent of Government colleges are in support of ICT based education in colleges of polytechnic. Also Autonomous colleges provide better facilities to students and teachers both from most of the perspective and parameters. It is also concluded that availability of budget for ICT tools is must as it achieves maximum frequency in both type of institute. Therefore, it can be stated that budget is an essential and important parameter which directly or indirectly affects the ICT based education.

VI. CONCLUSION

The results of this study suggest that availability and implementation of various ICT resources in the laboratories of polytechnic colleges are at significant level so that may enhance the status and performance of learning from both the side teachers and students. The findings of this study indicate that the existing level of ICT knowledge and skills acquired by polytechnic education teachers is limited with use of word processing. The provision of ICT facilities in polytechnic colleges alone will not quench the thirst for ICT skills training needs among teachers and students, rather it should be accompanied by strong technical and pedagogical support to enable teachers and students heavily infused technology in teaching and learning process.

VII. SUGGESTION

1. Government needs to pay more attention on efficient and intensive training for both teachers and college Administration to ensure the development of teachers' competence for effective utilization of ICT facilities in teaching and learning process.
2. As part of the training, the ICT facilities such as laptops, internet facility should be given to each and every teacher to facilitate skills acquisition and improvement in practice.
3. Seminars, workshops and conferences should be organized to facilitate the process of teachers' professional development and student's personality development along with the session that help them with the interface and utilization of various software and ICT tools.
4. Making ICT skills training free and compulsory for polytechnic teachers and it should be considered as in-service faculty development programme on ICT proficiency courses.

VIII. FUTURE SCOPE

The conclusion drawn above for all the categories are from limited no of responses as compare to area covered. The better performance can be achieved by more number of responses. The study can also consider other parameters that can be implemented in classrooms for the better teaching and learning process.

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