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Technology Adoption in Teaching at Higher Education Level: A comparison of Generation X and Generation Y Teachers

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Abstract

Technology, in the last few decades, has shown a significant impact on almost all aspects of Higher Education globally. Technology has brought many new opportunities and many new ways of improving access to quality of Higher Education. Various surveys at National and international level have already shown the increase use of Technology in classrooms like usage of Power Point Templates (PPTs), projectors and LED screens, smart classrooms, use of course web pages, online assignments, computer simulations and so on. No doubt the technology has the potential to revolutionize the old method of teaching and teaching pedagogy. Technology has certainly removed barriers in the way of access to higher education. Nowadays it is not difficult for any person living in one country to access quality education which is being provided by some professor in some other country. Even time is no more a barrier as lectures delivered are being stored on web/cloud. Yet, for various reasons, adoption of Technology is still uneven from country to country, from institute to institute, and from generation to generation. Empirically, Generation X people have been termed as slow learners of technology. Going by this theme, an effort has been made to examine the comparative usage of technology by Generation X and Generation X teachers in imparting higher education. For the purpose of this primary survey, faculty teaching in colleges located in Chandigarh, Panchkula and Mohali cities, popularly known as tricity was taken as population. Further, a sample of 200 faculty members from these colleges was selected. A scaled questionnaire was used as survey instrument to collect data. Results were obtained using various univariate and bivariate statistical tools. The results have clearly shown that usage of technology by Generation X teachers is significantly lower as compared to Generation X teachers. Generation X teachers were found to be reluctant to integrate technology in their teaching pedagogy. Also, many teachers from Generation X felt that usage of technology cannot serve much and traditional methods of teaching were still relevant and effective.

Keywords: Generation X, Generation Y, Higher Education, Teachers, Technology Adaptation

Introduction

Technology, in the last few decades, has shown a significant impact on almost all aspects of Higher Education globally. Technology has brought many new opportunities and many new ways of improving access to quality of Higher Education. Incorporating technology into

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

teaching while delivering lectures is of immense importance for teachers. Besides, many other stakeholders such as policymakers, administration, parents, other academicians, and students are likely to be more interested in technology integration into teaching which can enhance student learning and enable them for their future job roles where technology will be used at much higher scale [1].Various surveys at National and international level have already shown the increase use of Technology in classrooms like usage of Power Point Templates (PPTs), projectors and LED screens, smart classrooms, use of course web pages, online assignments, computer simulations and so on [2]. However, the pace at which technology is growing is not easy to match for the teachers.

Review of Literature

Abbott (2014)[2]observed that teachers in current era may not be adequately equipped with the kind of knowledge and constant updating that is required to adopt technology in higher education. Moreover they may not be even keen to know how to use technology in teaching because it will require extra effort on part of them for which they may not be paid. Rotherham & Willingham (2009)[3] explored unique skills of teachers in implementing Technology in higher education. They opined that all teachers are unique in context of their skills and methods to implement technology in teaching. However, they also raised the issue of acceptance of technology in teachers belonging to Generation X.

Eduview (2008)[4] found the gap of lesser research focused on generational differences among teachers in relation to adoption of technology in teaching. Carol (2007)[5] has opined that at present there are both generation teachers i.e.Generation X and Generation X. However Generation X teachers are more idealistic and oriented to teamwork, focused on collaboration and constant communication, multi-tasking in nature and supporting new technology. It is more comfortable for Generation X teachers to adopt new technology faster than Generation X.

Brown & Fritz (2001)[6] clarified that the generational gap between the teachers and the students in classrooms is rather a mismatch between the teaching style of teacher and learning style of students and it is lesser about age differences. And Generation X teachers most likely prefer to stick to one or two styles rather than moulding themselves as per the needs of the students. They are of the belief that Generation X teachers must not only be aware of the style of student learning but at the same time, be aware of the style of their own teaching also.

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

Altbach et al. (2005)[7] opined that advancement in technology has influenced the nature of knowledge and also the social organisation of teaching and learning. However, despite the fact, the gap between the advancement in technology and adoption of technology in teaching can last for many centuries. Innovations spread very slowly in the field of teaching.Beverage (2003)[8] observed that the world of Information Technology is at a faster pace, is ever changing. At the same time, the culture of higher education is relatively slow. This has created rift between the fast paced culture of it and as slower paced culture of Higher Education.

Problem Definition

Adoption of technology is still uneven from country to country, from institute to institute, and from generation to generation. Empirically, Generation X people have been termed as slow learners of technology. It has been an issue of concern that teachers of Generation X have not been able to keep up their pace with technology advancements, however Generation X teachers are learning and adopting technology fast. Going by this theme, an effort has been made to examine the comparative usage of technology by Generation X and Generation X teachers in imparting higher education and their perceptions about integrating technology in education.

Objectives

The study has focused on two main objectives as below.

1. To ascertain the level of usage and adoption of technology by Generation X and Generation Y teachers in higher education.
2. To compare the perceptions of Generation X and Generation Y teachers with respect to integrating technology in imparting higher education.

Hypotheses

The study has attempted to examine following hypotheses.

H_1: There is no significant difference between teachers of Generation X and Generation X with respect to the level of usage and adoption of technology in higher education.

H_2: There is no significant difference between teachers of Generation X and Generation X with respect to the perceptions about integrating technology in imparting higher education.

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

Research Design

The present study has been exploratory and qualitative in nature. It deals with two generations of teachers viz. Generation X and Generation Y. It is likely to find varying dates for the four primary categories of generations; however, the most common criteria has been that Generation X refers to people born between the years 1961 – 1981, and Generation Y or Millennials refers to people born between the years 1982 – 2000. The same rule has been followed. Furthermore, survey method was used to collect data from various teachers. A well designed and scaled questionnaire was used to collect data. Usage of technology was measured on a five point scale ranging from "Never" to "Always" with weightage assigned from 1 to 5 respectively. Perceptions were measured using popular scale ranging from "Strongly Disagree" to "Strongly Agree"with weightage assigned from 1 to 5 respectively. Mean and standard deviation values were computed for various statements for Generation X and Generation Y teachers. Analysis of Variance (ANOVA) was finally used to facilitate comparisons between Generation X and Generation Y teachers.

Data Analysis & Discussion

Data analysis has been carried out in two parts. First part deals with assessment of usage of technology by Generation X and Generation Y teachers. Second part of data analysis deals with the perceptions of Generation X and Generation Y teachers with respect to usage of technology in higher education. Results along with discussion are as below.

Technology Adoption in Higher Education by Teachers

For this purpose, three different stages of usage of technology have been identified viz. usage of technology before class, usage of technology while delivering lecture/class, and finally usage of technology after delivering class and at the time of assessing the performance of students.Table-1 deals with the level of usage of technology by Generation X and Generation Y teachers while preparing for the class. Four activities were identified in this area where technology is integrated in education. These four activities included Online Submission of Coursework, Developing/Supporting "Learning Communities", Interactive Learning Materials (e.g. Animations, Simulations, PPTs), and finally Creation of Collaborative Documents (e.g. Using Wikis, Shared File Space).

Average level of usage of technology has been found to be 3.45 approximately. It indicates usage to be sometimes to frequently as per scale values. Mean value of this type of usage of

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

technology is higher in case of Generation Y teachers as compared to Generation X teachers. Generation Y teachers frequently use technology while preparing class whereas Generation X teachers rarely or sometimes use technology when preparing for class. Hence, there is clearly a difference between Generation X and Generation Y teachers when it comes to using technology while preparing for class.

Table-1: Using Technology while Preparing for Class

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	2.4433	.65576	**389.060**	**.000***
Gen-Y	125	4.0520	.49115		
Total	**200**	**3.4488**	**.95905**		

* F-value is significant at 5% level of significance.

In order to examine the significance of difference between Generation X and Generation Y teachers for this aspect, Analysis of Variance (ANOVA) has been used. Null hypothesis in this case has been that there is no significant difference between Generation X and Generation Y teachers with respect to usage of technology while preparing for class. F-value in this case has been found to be 389.060 which is significant at 5% level of significance. Hence, null hypothesis assuming no significant difference between Generation X and Generation Y teachers with respect to usage of technology while preparing for class stands clearly rejected. It can be established that the usage of technology while preparing for class has been significantly higher in case of Generation Y teachers as compared to Generation X teachers.

Table-2 covers the uses of Technology in higher education while delivering lecture in the class. Technology is used in many different ways by teachers at the time of delivery of their lectures. In the current survey, four ways of using technology at the time of delivering class work identified. These includedDelivering Multimedia (e.g. Audio, Video, PPTs), Distributing Learning Materials (e.g. Lecture Notes, Reading Lists, Web-links), Distributing Admin Information (e.g. Module Handbook, Assessment Details), and Student Collaboration or Group Activities Online. Overall mean value has been found to be 3.55. It indicates the level of usage of technology in education at this stage to be between sometimes to frequently. Mean value in case of teachers of Generation X has been found to be 3.44 while in case of teachers of Generation X, the same has been 3.62. Thus, teachers belonging to Generation X seem to be using technology more than Generation X teachers at this stage.

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

Table-2: Using Technology while Delivering Class

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	3.4400	.60661	**4.501**	**.035***
Gen-Y	125	3.6200	.56494		
Total	**200**	**3.5525**	**.58595**		

* F-value is significant at 5% level of significance.

In order to find the significance of this observation, ANOVA has been used. Null hypothesis here has been that there is no significant difference between Generation X and Generation Y teachers with respect to usage of technology while delivering class. F-Value has been found to be around 4.5 which is significant at 5% level of significance. Hence, null hypothesis stating that there is no significant difference between Generation X and Generation Y teachers with respect to usage of technology while delivering class stands rejected. It can be now claimed that teachers belonging to Generation Xuse technology while delivering lecture more than Generation X teachers.

Table-3 presents data related to use of technology after the class and at the time of assessment of performance of students. This stage covered four unique activities. These activities included Synchronous (in real time): Student to Teacher (e.g. Twitter, Instant Messaging), Online Assessment, Plagiarism Detection, and Providing Online Revision Exercise. Overall mean value here has been 2.91 which is slightly lower than the earlier two stages. It seems that teachers use technology more at the time of preparing for class and while delivering the class. But the usage of technology after class and at the time of assessment is low. Value of Generation X has been found to be 1.70 while mean value in case of Generation X is 3.63. Here also, it is clearly visible that Generation X teachers are more proactive in usage of technology after the class and in case of assessing the performance of students.

Table-3: Using Technology Post Class and at Assessment

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	1.7033	.47522	**541.363**	**.000***
Gen-Y	125	3.6340	.61692		
Total	**200**	**2.9100**	**1.09506**		

* F-value is significant at 5% level of significance.

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

To ascertain if the observation is statistically significant, ANOVA has been used. Null hypothesis here has been that there is no significant difference between Generation X and Generation Y teachers with respect to usage of technology after class and at assessment stage. F-Value has been found to be 541.363. This value is statistically significant. Hence, the null hypothesis that there is no significant difference between Generation X and Generation Y teachers with respect to usage of technology after class and at assessment stagestands rejected. It can now be claimed that Generation X teachers are more active and use technology more than Generation X in post class stage and at the time of assessment of performance of students.

Teachers' Perceptions about using Technology in Higher Education

Four different types of perceptions were covered at this stage. These included perception that Traditional Teaching Not Replaceable by Technology, Technology Important for Higher Education, Technology Integration Good for Teaching, and finally that technology is difficult to use in classrooms.

Table-4 deals with the perceptions that traditional teaching is not replaceable with technology. Four statements were put in this. These four statements included (1) Technology can never come close to the knowledge and life experience, a teacher brings, (2) The trust and bond between a teacher and student creates the perfect learning environment; which can never be achieved through virtual learning, (3) Even in a technology-infused learning environment, the role of the teacher will remain ever-important, and finally (4) I am not sure yet about the benefits of using technology in my teaching.

Average level of response to these statements has been found to be 3.32 approximately. It indicates response to be between neutral and agree as per scale values. Mean value of responses is higher in case of Generation X teachers as compared to Generation Y teachers.Clearly, Generation X teachers are of the firm belief that technology in no way can replace traditional teaching. Thus, the perception of Generation X teachers is that technology is not a substitute for a teacher using traditional teaching. This belief however, is not that firm in case of Generation Y teachers.

Table-4: Traditional Teaching Not Replaceable by Technology

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	4.2533	.54756		
Gen-Y	125	2.7620	.56695	**332.704**	**.000***
Total	**200**	**3.3213**	**.91415**		

* F-value is significant at 5% level of significance.

In order to examine the significance of difference between Generation X and Generation Y teachers for this perception, Analysis of Variance (ANOVA) has been used. Null hypothesis in this case has been that there is no significant difference between Generation X and Generation Y teachers with respect to perception that traditional teaching is not replaceable with technology. F-value in this case has been found to be 332.704 which is significant at 5% level of significance. Hence, null hypothesis assuming no significant difference between Generation X and Generation Y teachers with respect to perception that traditional teaching is not replaceable with technology stands clearly rejected. It can be established that Generation X teachers perceive that traditional teaching methods cannot be substituted by technology while the degree of similar perception is lower in case of Generation Y teachers.

Table-5 covers perceptions that technology is now quite important for higher education. In the current survey, three statements related to this perception were put into questionnaire. These included (1) My institution encourages me to use technology in my teaching, (2) I think technology will be an essential part of teaching in the future, and (3) The teacher will have to become a facilitator of parting trustworthy information from electronic sources to the students. Overall mean value has been found to be 2.46. It indicates the level of agreement to be between disagree to neutral. Mean value in case of teachers of Generation X has been found to be 2.27 while in case of teachers of Generation X, the same has been 2.57. Thus, teachers belonging to Generation X seem to be more convinced about the importance of technology in higher education thanGeneration X teachers at this stage.

Table-5: Technology Important for Higher Education

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	2.2733	.50866		
Gen-Y	125	2.5700	.51451	**15.717**	**.000***
Total	**200**	**2.4588**	**.53094**		

* F-value is significant at 5% level of significance.

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

In order to find the significance of this observation, ANOVA has been used. Null hypothesis here has been that there is no significant difference between Generation X and Generation Y teachers with respect to perception that technology is important for higher education. F-Value has been found to be around 15.71 which is significant at 5% level of significance. Hence, null hypothesis stating that there is no significant difference between Generation X and Generation Y teachers with respect to perception that technology is important for higher educationstands rejected. It can be now claimed that teachers belonging to Generation Xperceive that technology is important for higher education more than Generation X teachers.

Table-6 presents data related to perceptions that technology integration is good for teaching. This perception was based on three statements. These statements included(1) My students look to me for technology support, (2) I experiment with technology in my teaching, and (3) I am confident using technology in my teaching. Overall mean value here has been 3.66 Value of Generation X has been found to be 2.64 while mean value in case of Generation X is 4.26. Here also, it is clearly visible that Generation X teachers believe that technology integration brings good results in teaching while Generation X teachers are not much convinced with it.

Table-6: Technology Integration Good for Teaching

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	2.6444	.57561		
Gen-Y	125	4.2640	.59763	**353.809**	**.000***
Total	**200**	**3.6567**	**.98163**		

* F-value is significant at 5% level of significance.

To ascertain if the observation is statistically significant, ANOVA has been used. Null hypothesis here has been that there is no significant difference between Generation X and Generation Y teachers with respect to perception that technology integration is good for teaching. F-Value has been found to be 353.809. This value is statistically significant. Hence, the null hypothesis that there is no significant difference between Generation X and Generation Y teachers with respect to perception that technology integration is good for teaching stands rejected. It can now be claimed that Generation X teachers believe more about good outcomes of technology integration with teaching than Generation X teachers.

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

Table-7 deals with the perceptions that usage of technology in teaching is difficult. Two statements were identified in this. These included (1) My students are more confident using technology than I am, and (2) I am a late adopter of using technology in my teaching. Average level of agreement with this perception has been found to be 3.5 approximately. It indicates agreement to be between neutral and agree as per scale values. Mean value of this statement is higher in case of Generation X teachers as compared to Generation Y teachers. Generation Y teachers, as per the responses, are more comfortable using technology in teaching while Generation X teachers find it difficult to use technology in teaching. Hence, there is clearly a difference between Generation X and Generation Y teachers when it comes to using technology in teaching.

Table-7: Difficulty in Using Technology

Generation	N	Mean	Std. Dev.	F	Sig.
Gen-X	75	4.2800	.71301		
Gen-Y	125	3.0280	.84792	**114.760**	**.000***
Total	**200**	**3.4975**	**1.00313**		

* F-value is significant at 5% level of significance.

In order to examine the significance of difference between Generation X and Generation Y teachers for this aspect, Analysis of Variance (ANOVA) has been used. Null hypothesis in this case has been that there is no significant difference between Generation X and Generation Y teachers with respect to perception that usage of technology in teaching is difficult. F-value in this case has been found to be 114.760 which is significant at 5% level of significance. Hence, null hypothesis assuming no significant difference between Generation X and Generation Y teachers with respect to perception that usage of technology in teaching is difficult stands clearly rejected. It can be established that the comfort of using technology has been significantly higher in case of Generation Y teachers as compared to Generation X teachers.

Conclusion

The study has resulted in some interesting findings. Firstly, in line with empirical studies, there are certain differences between Generation X and Generation Y teachers with regard to integrating technology in teaching. Generation X teachers incorporate technology but to a limited extent. They use PPTs etc. but fail to use communication networks or computer simulations etc. with students. Also they lack in using technology for follow up with students

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

and assessment of performance of students. On the other side, Generation Y teachers are good adopters of technology and they are able to use most of the technology in and outside classrooms. Then there are perceptual differences between Generation X and Generation Y teachers. Generation X teachers find it difficult to use technology. Moreover they are of the view that technology cannot replace traditional methods of teaching. They also have doubts about the benefits of using technology in teaching. Hence, these perceptions keep them away from using technology in classrooms. Both the hypotheses stated in the beginning of research stand rejected proving that Generation Y teachers are proactive in using technology in classrooms and they have a positive mind-set for technology integration in higher education.

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