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UTILIZATION OF DIGITAL TECHNOLOGIES AMONG ENGINEERING STUDENTS IN CHENNAI AND TIRUVALLUR DISTRICTS

Dr. T. SIVASAKTHI RAJAMMAL,

Assistant Professor,

Department of Educational Psychology,

Tamil Nadu Teachers Education University,

Chennai- 600 097, Tamil Nadu, India.

Abstract

The digital revolution has changed, and continues to change, our world and our lives. Computer-based technology has infiltrated many aspects of life and industry, yet there is little understanding of how it can be used to promote student engagement, a concept receiving strong attention in higher education due to its association with a number of positive academic outcomes. Currently, major aspects of our lives have moved online due to the corona virus pandemic, and social distancing has necessitated virtual togetherness. Utilization of Digital Technologies Scale was Constructed and Standardized by Investigators has been administrated to a random sample of 1152 Engineering Students. It is found that Engineering Students significantly differ in Utilization of digital technologies with respect to Gender, Locality, Year of Study, Age, Stream of Study and Type of management of Engineering Students.

Keywords: Utilization, Digital Technologies, Engineering Students.

1. INTRODUCTION

Digital technologies are electronic tools, systems, devices and resources that generate, store or process data. Well known examples include social media, online games, multimedia and mobile phones. Digital learning is any type of learning that uses technology. Digital technology enables immense amounts of information to be compressed on small storage devices that can be easily preserved and transported. Digitization also quickens data transmission speeds. Digital technology has transformed how people communicate, learn, and work. Over the years, a great number of studies and research has been conducted. It shows various benefits of the use of technology in education. It is making the role of technology an important element in the educational sphere. The technology should enhance learning rather it should implement the improvement of our education system in order to enhance learning. The mixture of technology and education opens up endless possibilities. Thus, the use of technology brings about various delivery methods. It has access to a massive amount of information, global interaction to enhance learning, and excellent examples through simulations and models.

2. NEED AND IMPORTANCE OF THE STUDY

Technology has become an inseparable part of almost every aspect of today's life especially Engineering Colleges. In terms of education also, it is bringing about a massive change in the way it is imparted.As a teaching aid, the advent of technology was not an immediate step. It highly adopts by educational institutions. They gradually came to realize its importance in imparting education. The use of technology has been given a whole new meaning to education. However, the educational system has completely transformed by adopting technological advancements. The combination of technology and education have brought upon a revolution in the sphere of learning for the greater good.

Many of today's high-demand jobs were created in the last decade, according to the International Society for Technology in Education (ISTE). As advances in technology drive globalization and digital transformation, teachers can help students acquire the necessary skills to succeed in the careers of the future. The COVID-19 pandemic is quickly demonstrating why online education should be a vital part of teaching and learning. By integrating technology into existing curricula, as opposed to using it solely as a crisis-management tool, teachers can harness online learning as a powerful educational tool.

The effective use of digital learning tools in classrooms can increase student engagement, help teachers improve their lesson plans, and facilitate personalized learning. It also helps students build essential 21st-century skills. Virtual classrooms, video, augmented reality (AR), robots, and other technology tools can not only make class more lively, they can also create more inclusive learning environments that foster collaboration and inquisitiveness and enable teachers to collect data on student performance. Still, it's important to note that technology is a tool used in education and not an end in itself. The promise of educational technology lies in what educators do with it and how it is used to best support their students' needs.

3. REVIEW OF LITERATURE

- **Lakshmi Dhandabani(2015).** Amongst the various open source educational software, the Modular Object Oriented Developmental Learning Environment (MOODLE) seems to be the most user friendly having numerous features. This paper aims at investigating the usefulness of digital technologies imparted into a blended learning model for engineering education. The role of Information and Communication Technology (ICT) plays a wider role in teaching-learning activities like, content creation, administrative, formative-summative assessments, student's performance tracking, trainings, knowledge management and knowledge organization. In addition, the technical features of ICT allow us to customize to meet the demands of an institution. Considering the recent major shifts in the learning paradigm, these innovations were deployed in an ongoing, real time basis in our educational campus. Technology based virtual learning approach was aimed at stimulating students' interest in learning engineering curriculum; consequently its effectiveness was statistically evaluated. Finally, this research report is aimed at summarizing the ways in which ICT is used, and how it creates new learning opportunities both online and off line.
- **ShadnazAsgari, JelenaTrajkovic, Mehran Rahmani, Wenlu Zhang, Roger C. Lo, Antonella Sciortino (2021).**The COVID-19 pandemic compelled the global and abrupt conversion of conventional face-to-face instruction to the online format in many educational institutions. Urgent and careful planning is needed to mitigate negative effects of pandemic on engineering education that has been traditionally content-centered, hands-on and design-oriented. To enhance engineering online education during the pandemic, we conducted an observational study at California State University, Long Beach (one of the largest and most diverse four-year university in the U.S.). A total of 110 faculty members and 627 students from six engineering departments participated in surveys and answered quantitative and qualitative questions to highlight the challenges they experienced during the online instruction in Spring 2020. Our results identified various issues that negatively influenced the online engineering education including logistical/technical problems, learning/teaching challenges, privacy and security concerns and lack of sufficient hands-on training. These recommendations are practical approaches for many similar institutions around the world and would help improve the learning outcomes of online educations in various engineering subfields. As the pandemic continues, sharing the results of this study with other educators can help with more effective planning and choice of best practices to enhance the efficacy of online engineering education during COVID-19 and post-pandemic.

4. OBJECTIVES OF THE STUDY

The following objectives have been formulated by the investigator for the present study,

1. To find out the level of utilization of digital technologies of Engineering Students.
2. To find out the difference between Male and Female Engineering Students with respect to their utilization of digital technologies.
3. To find out the difference between Engineering Students studying in college located at rural and urban areas with respect to their utilization of digital technologies.
4. To find out the difference between the I Year, II Year, III Year and Final Year Engineering Students with respect to their utilization of digital technologies.
5. To find out the difference among Engineering Students belonging to different age group (below 20 years, 20-25 years, 25 years and above) with respect to their utilization of digital technologies.
6. To find out the difference among Engineering Students belonging to different stream of study [EEE/ECE/Civil/Mechanical] with respect to their utilization of digital technologies.
7. To find out the significant difference among Engineering Students studying in different types of management (Government., Government aided/ Self Financing) with respect to their utilization of digital technologies.

5. HYPOTHESES OF THE STUDY

1. The level of utilization of digital technologies of Engineering Students.
2. There is a significant difference between Male and Female Engineering Students with respect to their utilization of digital technologies.
3. There is a significant difference between Engineering Students studying in college located at rural and urban areas with respect to their utilization of digital technologies.
4. There is a significant difference between the I Year, II Year, III Year and Final Year Engineering Students with respect to their utilization of digital technologies.
5. There is a significant difference among Engineering Students belonging to different age group (below 20 years, 20-25 years, 25 years and above) with respect to their utilization of digital technologies.
6. There is a significant difference among Engineering Students belonging to different stream of study [EEE/ECE/Civil/Mechanical] with respect to their utilization of digital technologies.

7. There is a significant difference among Engineering Students studying in different types of management (Government., Government aided/ Self Financing) with respect to their utilization of digital technologies.

6. METHOD OF THE STUDY

The investigator was adopted the survey technique with descriptive method for the study.

6.1 Population of the study

The population of the study consists of Engineering Students of Chennai and Tiruvallur districts in Tamil Nadu.

6.2 Sample of the study

A sample is a small proportion of Engineering Students which was selected for observation and analysis. The investigator used random sampling technique for selecting the sample of 1152 Engineering Students.

6.3 Statistical Techniques Used

Descriptive analysis, Differential analysis and Correlation analysis ('t' test, 'F' test and 'r' test) were used in the present study to test the hypotheses and interpret the data.

6.4 Tools Used for the Study

The investigator constructed the Utilization of digital technologies scale. The scale used for the pilot study, consists of 76 items. All the 76 items were with five point scale (1) Always, (2) Often, (3) Sometimes, (4) Occasionally and (5) Never type answers. In order to validate the tool the investigator conducted the pilot study. The pilot study was conducted among 100 Engineering Students. The total number of sample used for the pilot study was 116. The investigator scored the test by giving (5-0) to the Positive response. The total number of marks secured by each sample was calculated by the investigator. Based on the total marks secured by the sample item total correlation was used to identify the reliability of the tool. The items with 0.5 level value above 0.3 was selected for the final study. Thus out of 76 items, 66 items were selected for the final study. The item total correlation and the selection of items for the final study were analyzed.

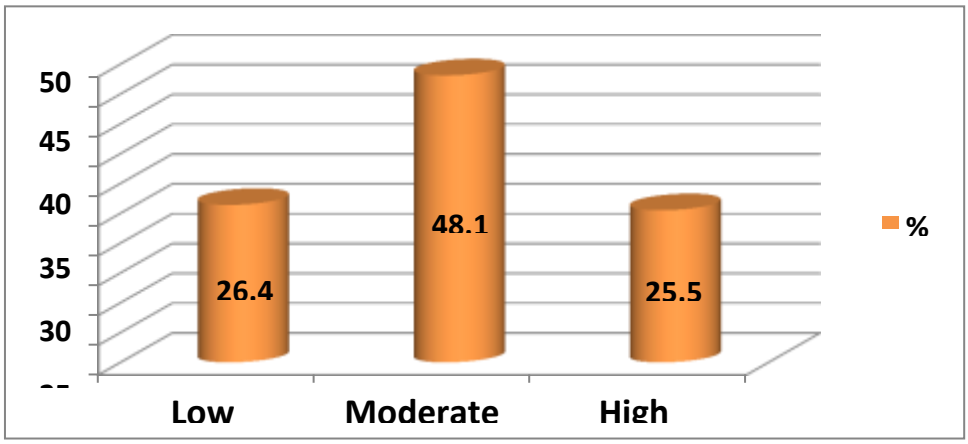
7. DESCRIPTIVE ANALYSIS

Hypothesis 1 : The level of utilization of digital technologies of Engineering Students.

Table 1: The level of utilization of digital technologies of Engineering Students.

Level of Utilization of Digital Technologies	**Count**	**%**
Low	304	26.4
Moderate	554	48.1
High	294	25.5
Total	**1152**	**100.0**

Figure – 1: The level of utilization of digital technologies of Engineering Students.



Hypothesis 2: There is a significant difference between Male and Female Engineering Students with respect to their utilization of digital technologies.

Table 2: Mean and Standard Deviation Scores of utilization of digital technologies and its dimensions of Male and Female Engineering Students and the calculated "t" Values.

Digital Technologies and its dimensions	Gender				t value	P Value	Remarks
	Male (N=411)		Female (N = 741)				
	Mean	SD	Mean	SD			
E-Book	57.36	10.08	58.83	9.92	2.341	0.019	0.05 Significant
Websites	79.57	16.06	80.91	16.28	1.331	0.183	Not Significant
Smart Phones	19.55	5.70	19.72	5.66	0.473	0.636	Not Significant
Social Media	21.68	5.29	21.81	5.22	0.405	0.686	Not Significant
Video Streaming	49.13	10.14	50.19	10.53	1.645	0.100	Not Significant
Overall Utilization of Digital Technologies	**227.30**	**40.80**	**231.46**	**41.60**	**1.624**	**0.105**	**Not Significant**

From the Table 2, it is inferred that 't' value is 2.341 which is higher than the table value of 1.96 to be significant at 0.05 level of significance. It is concluded that there is significant difference between digital technologies and its dimension namely, E-Book 2.341 in their mean and standard deviation of digital technologies scores with respect to Male and Female Engineering Students. From the Table 2, it is inferred that 't' value is 1.624 which is less than the table value of 1.96 to be significant at 1.00 level of significance. But, It is calculated that there is no significant difference between the Utilization of Digital Technologies dimensions namely; Websites 1.331, Smart Phones 0.473, Social Media 0.405 and Video Streaming 1.645, in their mean and standard deviation of digital technologies scores with respect to Male and Female Engineering Students.

Therefore significant difference between Male and Female Engineering Students in respect of their Utilization of digital technologies and its dimension namely, E-Book, Websites, Smart Phones, Social Media and Video Streaming of the hypothesis number 2 is rejected. It is inferred that both Male and Female Engineering students do not differ significantly in their utilization of digital technologies.

Hypothesis 3: There is a significant difference between Engineering Students studying in college located at rural and urban areas with respect to their utilization of digital technologies.

Table 3: Mean and Standard Deviation Scores of Digital Technologies and its dimensions of Rural and Urban Engineering Students and the calculated "t" Values.

Digital Technologies and its dimensions	Locality				t value	P value	Remarks
	Rural (N=455)		Urban (N=697)				
	Mean	SD	Mean	SD			
E-Book	57.05	9.90	58.38	10.11	2.198	0.028	0.05 Significant
Websites	79.47	15.46	80.38	16.57	0.942	0.346	Not Significant
Smart Phones	19.80	5.33	19.48	5.91	3.655	0.001	0.01 Significant
Social Media	21.46	5.05	21.90	5.39	2.110	0.035	0.05 Significant
Video Streaming	48.86	10.17	49.89	10.33	1.304	0.193	Not Significant
Overall Utilization of Digital Technologies	**226.64**	**39.31**	**230.04**	**42.20**	**3.030**	**0.002**	**0.01 Significant**

From the Table 3, it is inferred that 't' value is 3.030 which is higher than the table value of 2.6 to be significant at 0.01 level of significance. It is concluded that there is significant difference between utilization of digital technologies and its dimension namely, Smart Phones 3.655 in their mean and standard deviation of digital technologies scores with respect to Rural and Urban Engineering Students. But, E-Book 2.198 and Social Media 2.110 are less than the table value of 2.6 to be significant

at 0.05 level of significant.

But, calculated table value from the Table 3, it is inferred that 't' value is Websites 0.942 and Video Streaming 1.304 which is less than the table value of 2.6 to be significant at 1.00 level of significance. It is inferred that both Rural and Urban Engineering Students do not differ significantly in their dimension Websites and Video Streaming in their mean and standard deviation of digital technologies scores with respect to Rural and Urban Engineering Students. There is a significant difference between Rural and Urban B.Ed. Trainees in respect of their utilization of digital technologies and its dimensions namely, E-Book, Websites, Smart Phones, Social Media and Video Streaming of the hypothesis 3 is accepted. It is inferred that both Rural and Urban Engineering Students differ significantly in their utilization of digital technologies.

Hypothesis 4: There is a significant difference between the I Year, II Year, III Year and Final Year Engineering Students with respect to their utilization of digital technologies.

Table 4: Difference among Engineering Students with Year of Study in their utilization of digital technologies and its dimensions with calculated "F" Values.

Digital Technologies and its dimensions	**Df = (1,149)**			**Calculated 'F' Value**	**'P' Value**	**Remarks**
	Source of Variation	**Sum of Squares**	**Mean Square**			
E-Book	Between Groups	166.745	83.373	0.825	0.438	Not Significant
	Within Groups	116056.622	101.007			
Websites	Between Groups	1664.761	832.380	3.207	0.041	0.05 Significant
	Within Groups	298184.652	259.517			
Smart Phones	Between Groups	465.562	232.781	7.276	0.001	1.00 Significant
	Within Groups	36760.657	31.994			
Social Media	Between Groups	177.120	88.560	3.212	0.041	0.05 Significant
	Within Groups	31684.200	27.575			
Video Streaming	Between Groups	503.938	251.969	2.391	0.092	Not Significant
	Within Groups	121079.840	105.378			
Overall Utilization of Digital Technologies	**Between Groups**	**11858.775**	**5929.388**	**3.526**	**0.030**	**0.05 Significant**
	Within Groups	**1932270.904**	**1681.698**			

From the Table 4, it is inferred that 'F' value is 3.526 which is higher than the table value of 3.00 to be significant at 0.05 level of significance. It is concluded that there is significant difference between utilization of digital technologies and its dimension namely, Websites 3.207, Smart Phones 7.276 at 0.01 level and Social Media 3.212 in their mean square of digital technologies scores with respect to Year of study of Engineering Students.

But, calculated 'F' table value is less than 3.00 at 1.00, level of significance. It is concluded that there is no significant difference among E-Book 0.825, and Video Streaming 2.391, dimensions on digital technologies in their mean square of digital technologies scores with respect to Engineering students. There is a significant difference among Engineering students with different year of study in respect of their, digital technologies and its dimensions namely, E-Book, Websites, Smart phones, Social Media and Video streaming of the hypothesis number 4 is accepted. It is inferred that among I year, II year, III Year and Final Year Engineering students differ significantly in their utilization of digital technologies.

Hypothesis 5: There is a significant difference among Engineering Students belonging to different age group (below 20 years, 20-25 years, 25 years and above) with respect to their utilization of digital technologies.

Table 5: Difference among Engineering students with different age in their utilization of digital technologies and its dimensions with calculated "F" Values.

Digital Technologies and its dimensions	Df = (1,149) Source of Variation	Sum of Squares	Mean Square	Calculated 'F' Value	'P' Value	Remarks
E-Book	Between Groups	2650.564	1325.282	13.408	0.000	0.01 Significant
	Within Groups	113572.803	98.845			
Websites	Between Groups	6139.507	3069.753	12.009	0.000	0.01 Significant
	Within Groups	293709.906	255.622			
Smart Phones	Between Groups	385.189	192.595	6.007	0.003	0.01 Significant
	Within Groups	36841.029	32.064			
Social Media	Between Groups	433.895	216.948	7.932	0.000	0.01 Significant
	Within Groups	31427.424	27.352			
Video Streaming	Between Groups	2141.600	1070.800	10.301	0.000	0.01 Significant
	Within Groups	119442.178	103.953			
Overall Utilization of Digital Technologies	**Between Groups**	**46758.093**	**23379.046**	**14.158**	**0.000**	**0.01 Significant**
	Within Groups	**1897371.587**	**1651.324**			

From the Table 5, it is inferred that 'F' value is 14.158 which is higher than the table value of 4.6 to be significant at 0.01 level of significance. It is concluded that there is a significance difference among digital technologies and its dimensions namely, E-Book 13.408, Websites 12.009, Smart Phone 6.007, Social Media 7.932 and Video Streaming 10.301 in their mean square digital technologies scores with respect to different age group of Engineering students. There is a significant difference among Engineering students belonging to different ages (below 20, 20-25 and above 25 years) in respect of their, digital technologies and its dimensions namely, E-Book, Websites, Smart phones, Social Media and Video streaming of the hypothesis 5 is accepted. It is inferred that among Engineering students with age below 20, 20-25 and above 25 years differ significantly in their utilization of digital technologies.

Hypothesis 6: There is a significant difference among Engineering Students belonging to different stream of study [EEE/ECE/Civil/Mechanical] with respect to their utilization of digital technologies.

Table 6: Difference among Engineering students with stream of studied degree in their utilization of digital technologies and its dimensions with calculated "F" Values.

Digital Technologies and its dimensions	Df = (1,149) Source of Variation	Sum of Squares	Mean Square	Calculated 'F' Value	'P' Value	Remarks
E-Book	Between Groups	3043.659	1521.830	15.450	0.000	0.01 Significant
	Within Groups	113179.708	98.503			
Websites	Between Groups	5244.873	2622.437	10.228	0.000	0.01 Significant
	Within Groups	294604.540	256.401			

Smart Phones	Between Groups	559.712	279.856	8.770	0.000	0.01 Significant
	Within Groups	36666.506	31.912			
Social Media	Between Groups	630.689	315.345	11.602	0.000	0.01 Significant
	Within Groups	31230.630	27.181			
Video Streaming	Between Groups	2414.408	1207.204	11.640	0.000	0.01 Significant
	Within Groups	119169.370	103.716			
Overall Utilization of Digital Technologies	**Between Groups**	**50407.385**	**25203.693**	**15.292**	**0.000**	**0.01 Significant**
	Within Groups	**1893722.294**	**1648.148**			

From the Table 6, it is inferred that 'F' value is 15.292 which is higher than the table value of 4.6 to be significant at 0.01 level of significance. It is concluded that there is a significance difference among digital technologies and its dimensions namely, E-Book 15.450, Websites 10.228, Smart Phone 8.770, Social Media 11.602 and Video Streaming 11.640 in their mean square digital technologies scores with respect to stream of studied degree of Engineering students. There is a significant difference among Engineering students belonging to Stream of studied degree (EEE/ECE/Civil/Mechanical) in respect of their, digital technologies and its dimensions namely, E-Book, Websites, Smart phones, Social Media and Video streaming of the hypothesis 6 is accepted. It is inferred that among EEE, ECE, Civil and Mechanical Engineering students differ significantly in their utilization of digital technologies.

Hypothesis 7: There is a significant difference among Engineering Students studying in different types of management (Government., Government aided/ Self Financing) with respect to their utilization of digital technologies.

Table 7: Difference among Engineering students with Type of Management in their digital technologies and its dimensions with calculated "F" Values.

Digital Technologies and its dimensions	**Df = (1,149)**			**Calculated 'F' Value**	**P' Value**	**Remarks**
	Source of Variation	**Sum of Squares**	**Mean Square**			
E-Book	Between Groups	103.172	51.586	0.510	0.600	Not Significant
	Within Groups	116120.195	101.062			
Websites	Between Groups	752.849	376.424	1.446	0.236	Not Significant
	Within Groups	299096.564	260.31			
Smart Phones	Between Groups	220.693	110.347	3.426	0.033	0.05 Significant
	Within Groups	37005.526	32.207			
Social Media	Between Groups	258.309	129.154	4.696	0.009	0.01

	Within Groups	31603.011	27.505			Significant
Video Streaming	Between Groups	420.187	210.093	1.992	0.137	Not Significant
	Within Groups	121163.591	105.451			
Overall Utilization of Digital Technologies	**Between Groups**	**7076.985**	**3538.493**	**2.099**	**0.123**	**Not Significant**
	Within Groups	**1937052.69**	**1685.86**			

From the Table 7, it is inferred that 'F' value is 2.099 which is less than the table value of 3.00 to be significant at 1.00 level of significant. It is concluded that there is no significant difference among digital technologies and its dimensions namely, E-Book 0.510, Websites 1.446, and Video Streaming 1.992 in their mean square digital technologies scores with respect to Type of Management of Engineering students.

But, calculated 'f' value 3.426 and 4.696 is greater than table value 3.00 at 0.05 and 0.01, level of significance. It is concluded that there is significance difference among Smart phones and Social Media on digital technologies in their mean square digital technologies scores with respect to Type of Management of Engineering students. There is a significant difference among Engineering students belonging to different Type of Management (Government., Government Aided and Self Financing) in respect of their, digital technologies and its dimensions namely, E-Book, Websites, Smart phones, Social Media and Video streaming of the hypothesis number 7 is rejected. It is inferred that among Government, Government Aided and Self Financing do not differ significantly in their Digital Technologies.

8. EDUCATIONAL IMPLICATIONS OF THE STUDY

Based on the investigation of the study, the implications were analysed and described.

- From the findings that the Engineering students has moderate level of utilization of digital technologies. Even though , It is inferred that both Male and Female Engineering students do not differ significantly in their utilization of digital technologies.
- It was concluded that, the digital technologies along with their dimensions doesn't show any significant difference among gender. The Engineering students should involve themselves to improve the utilization of digital technologies by updating their knowledge.
- It is inferred that both Rural and Urban Engineering Students differ significantly in their utilization of digital technologies. It was concluded that , Engineering students must involve in utilization of digital technologies to improve their academic achievement as well as carrier achievement
- It is inferred that among I year, II year , III Year and Final Year Engineering students differ significantly in their utilization of digital technologies. It was concluded that , they need to improve their practical knowledge using digital technologies in all the year of study.

9. RECOMMENDATIONS:

- The attitude towards digital technologies should be highly enhanced by the administrators to improve better teaching among the Engineering students.
- The Supervisor should be updated in the utilization of digital technologies sectors, so that the involvement of the Engineering students will become better towards practical knowledge.
- There should be a continuous motivation and guidance to the Engineering students for the betterment to develop the utilization of digital technologies.
- Whatever is the age group, constant motivation and encouragement leads to the success of academic achievement towards the latest technology.
- The Engineering students should involve themselves to improve the basic skills by updating the utilization of digital technologies towards learning.

10. SUGGESTIONS FOR THE FURTHER RESEARCH

Based on the findings, the investigation suggests the following for future study.

1. Comparative study for both male and female Engineering students in Digital Technologies may be conducted all over the state.
2. A similar research work may be undertaken with Engineering students studying in government, government aided and private colleges can be conducted all over the State.
3. Research may be conducted about Engineering students situated in rural and urban areas who are studying in Universities all over India.
4. A similar research work may be undertaken with Engineering students based on Year of study conducted all over the State.

11. CONCLUSION

This research work gives a brief explanation on variables used objectives and hypothesis, method of investigation, instruments used for the research, statistical techniques, analysis and clarification of the study reports. These studies may be much more important towards database analysis.

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