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Research Article   **Open Access**

Planning and Implementation of Digital Library in Engineering Colleges of Andhra Pradesh: A Study

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Abstract Digital library systems compose a family of automated systems that together provide a comprehensive capability to manage the digital content of an enterprise. As keepers and providers of information, the age-old social responsibility of libraries is re-emerging in the information society. In this paper the investigator tried to study the steps taken by the Engineering colleges towards the installation of Digital libraries, study the digital collection development, digital services of the libraries, identify the constraints in the digital library initiatives, and offer suggestions towards the improvement of digital library services.

Keywords *Digital libraries; JNTU; Engineering Colleges; Digital Collection Development; Digital Services*

1. Introduction

Information technology and globalization are likely to change the nature of libraries and their activities. Today, the library services are in transition from local traditional collections to global resources provided on demand via the most advanced networking technologies. With the advent of the internet, individuals' expectations for access to information have increased dramatically.

Digital library systems compose a family of automated systems that together provide a comprehensive capability to manage the digital content of an enterprise. As keepers and providers of information, the age-old social responsibility of libraries is re-emerging in the information society. Here the investigator tried to study the steps taken by the Engineering colleges towards the installation of Digital libraries, study the digital collection development, digital services of the libraries, identify the constraints in the digital library initiatives, and offer suggestions towards the improvement of digital library services.

2. Literature Reviewed

Ongus and Nyamboga (2004) discussed digital research libraries, reasons, advantages and disadvantages of digitization. They also described the development of research library studies and types of clients who were beneficiaries of the services. Finally they concluded that the essence of the digital library was to cater for the information needs of researchers in specific fields of specialization. Pradhan (2004) discussed the basics of developing a digital library and explained the new concepts underlying the digital library development, procedures, regarding technologies and managerial skills. Measures were needed to overcome the problems of computer viruses and also unauthorized user initial investment in digital libraries was high as maintenance and was therefore essential to explore the new sources of fund. Mandal and Panda (2005) conducted a study on collection development; that article provided an insight into the different dimensions of collection development with specific reference to engineering college libraries. They analyzed the data on library collections received from seventeen major Engineering College libraries of West Bengal. They enumerated the activities of seven major Library consortia of the world engaged in sharing resources among Engineering College libraries. Vignesh (2009) felt that over the past decade there have been many new initiatives in scholarly communications, Digital libraries and the development of educational, scientific and cultural heritage institutions with significant commitments to online resources and online services. The future of the digital library was a topic of continuing concern for the library professionals. Devraj (2002) discussed the Digital Libraries and their importance with the aid of internet for library operations by downloading information from remote databases. He stated on the minute classification of such libraries having standard protocol. He also narrated search engines and digital libraries on website via Internet. He also discussed all these aspects from the Indian point of view and the digital library network in operation in India. Krishnamurthy (2004) described the objectives of digital libraries. He also discussed the role of the digital library standards, collection management, cataloguing, and stages of digital libraries, and evaluation of various aspects. He emerged with a number of lessons from his paper which were described as model for digital library.

3. Objectives of the Study

- To study the steps taken by the JNTU affiliated Engineering colleges in A.P. towards the installation of digital libraries.
- To study the digital collection, digital services of the libraries.
- To offer suggestions towards the improvement of digital library initiatives.
- To identify the constraints in the digital library initiatives by the sample Engineering Colleges.

4. Hypotheses

- There is consensus among Engineering Colleges in developing a policy for establishing a digital library.
- There are constraints in establishing a digital library among engineering colleges in A.P.

5. Limitations of the Study

- The present study is confined to JNTU affiliated Engineering Colleges in A.P.
- Data has been collected from librarians of the Engineering Colleges only.

6. Methodology

This study attempts to examine the steps taken by the Engineering colleges towards the installation of digital libraries, study the availability of digital collection, digital services, identify the constraints in the digital initiatives, and offer suggestions towards the improvement of digital library services. The

universe of study covers all the JNTU-Kakinada (JNTUK) and JNTU-Anantapur (JNTUA) affiliated Engineering colleges in A.P. Purposive sampling was used to select the sample. The librarians have been considered as respondents for the study. The data was collected through the structured questionnaire.

7. Sample Size

In the present study, the Engineering colleges for survey are 22 out of 85 which were established between the years 1995 and 2005 in A.P. 26% of Engineering colleges were covered. Hence sample study system has been followed.

Table 1: Sample Size

Affiliation	Actual No. of Engineering Colleges	Select No. of Colleges for Sample	Percentage
JNTUK	55	14	25
JNTUA	30	8	25
Total	**85**	**22**	**25**

8. Provision of Digital Library in JNTU Engineering Colleges

11 (100%) Engineering Colleges of JNTUK and 7 (87.5%) Engineering colleges of JNTUA have provided Digital library facility in their respective libraries.

Table 2: Provision of Digital Library in JNTU Engineering College Libraries

n= 22

	Provision of Digital Library		Total
	Yes	**No**	
JNTUK	11 (78.57)	03(21.42)	14
JNTUA	07 (87.5)	01 (12.5)	08
Total	**18 (81.81)**	**04 (18.18)**	**22**

(Figures in Parentheses indicate percentage)

The above said data is presented in the Table 2. Totally 18(81.81%) of Engineering colleges provide Digital library facility. So, for the following tables the n is 22.

9. Availability of Digital Materials in the Engineering College Libraries of JNTU

Table 3: Availability of Digital Materials in the Engineering College Libraries of JNTU

n= 18

Type of Digital Material	JNTUK		JNTUA		Total
	Yes	**No**	**Yes**	**No**	
CD-ROMs, DVDs	11 (100.0)	-	7 (100.0)	-	18
Digital collections developed by the library	10 (90.9)	1 (9.1)	5 (71.4)	2 (28.6)	18
Digital materials downloaded from Internet	11 (100.0)	-	2 (28.6)	5 (71.4)	18
Learning materials	11 (100.0)	-	6 (85.7)	1 (14.2)	18
E-Books	2 (18.2)	9 (81.8)	2 (28.6)	5 (71.4)	18

E-Journals	9 (81.8)	2 (18.2)	6 (85.7)	1 (14.2)	18
Videos of the lectures of faculty	7 (63.6)	4 (36.4)	5 (71.4)	2 (28.6)	18
Model Question papers for competitive exams	11 (100.0)	-	7 (100.0)	-	18
Electronic theses and dissertations	4 (36.4)	7 (63.6)	2 (28.6)	5 (71.4)	18
Course material	8 (72.7)	3 (27.3)	7 (100.0)	-	18

(Figures in Parentheses Indicate Percentage)

The digital materials available in Engineering college libraries such as CD-ROMs, DVDs, digital collections developed by the libraries, materials downloaded from the Internet, learning materials in digital form, E-Books, E-Journals, videos of the lectures of the faculty of the respective colleges and as well as outside, model question papers, Electronic theses and dissertations, course materials from digital library software packages or somewhere etc.

The Table 3 clearly shows that the digital materials which are available in the Engineering college libraries under JNTU affiliation.

10. Acquisition of Digital Collection

From the Table 4 it is observed that 100% and 85.7% of JNTUK and JNTUA Engineering college libraries are acquiring the digital collection from Internet. Totally 94.4% of engineering college libraries of JNTU is acquiring digital collection from Internet. Less than 50% of JNTUK Engineering college libraries have acquired digital collection by donation, own preparation and also by purchasing software package. But in case of JNTUA Engineering college libraries 57.1% libraries are acquiring by own preparation and from purchased software packages. But these libraries are less dependent on donation for acquiring digital collections. From the tabulated data it is found that majority of engineering college libraries of JNTU did not depend on donation, own preparation and purchasing for acquisition of digital collection. Majority of them are depended on Internet.

Table 4: Acquisition of Digital Collection by Engineering College Libraries of JNTU

	From Internet		Donation		Own Preparation		Purchasing	
	Yes	No	Yes	No	Yes	No	Yes	No
JNTUK	11(100.0)	-	-	11(100.0)	1(9.1)	10(90.9)	2(18.2)	9(81.8)
JNTUA	6(85.7)	1(14.3)	3(42.8)	4(57.1)	4(57.1)	3(42.8)	4(57.1)	3(42.8)
Total	17(94.44)	1(5.5)	3(16.7)	15(83.33)	5(27.77)	13(72.22)	6(33.33)	12(66.66)

(Figures in Parentheses indicate percentage)

11. Method of Digitalize the Data in Engineering College Libraries

From the Table 5, it is observed that the Engineering college librarians are using key boards and scanners for converting the text document in to digital form and digital camera, web camera are using for recording the audio visual materials like lectures of the faculty, programs conducted by the college authorities.(i.e. seminars, conferences, workshops, college day celebrations etc.)

Table 5: Method of Digitalize the Data in Engineering College Libraries of JNTU

n= 18

	In case of Print Documents			In case of Audio Visual Documents		
	By Typing	By Scanning	Both	Digital Camera	Web Camera	Both
JNTUK	5 (45.4)	4 (36.4)	2 (18.0)	6 (54.5)	3 (27.3)	2(18.0)
JNTUA	3 (42.8)	2 (28.6)	2 (28.6)	3 (42.8)	2 (28.6)	2(28.6)
Total	8(44.44)	6(33.33)	4(22.22)	9 (50)	5(27.7)	4(22.22)

(Figures in Parentheses indicate percentage)

The above tabulated detailed data inferred that 45.4% of librarians of JNTUK Engineering colleges have digitalized their documents by typing, 36.4% of librarians are using scanners for digitalizing and 18% of librarians are using both keyboard and scanners for converting the text documents in to digital documents. JNTUA Engineering College librarians are using keyboards (42.8%), scanners (28.6%) and 28.6% are using both keyboards and scanners for converting the text documents into digital documents.

54.5% of JNTUK librarians of Engineering colleges are using digital cameras, 27.3% are using web cameras and 18.2% are using both the cameras for digitalizing the documents. JNTUA Engineering college librarians are using digital cameras (42.8%), 28.6% are using web cameras and 28.6% are using both digital and web cameras for converting text documents in to digital documents.

12. Data Storage Devices used by the Librarians of Engineering College of JNTU

The storage devices which are being used in engineering college libraries have been presented in the Table 6. The usage of CD-ROMs and DVDs as storage devices in engineering college libraries is very high i.e. above 70%. The next ranks go to hard disks followed by optical character recognition (OCR).

Table 6: Storage Devices Used by the Librarians of JNTU Engineering Colleges to Store the Digital Data

n=18

	CD-ROMs		Digital Video Discs (DVDs)		Optical Character Recognition (OCR)		Hard Discs	
	Yes	No	Yes	No	Yes	No	Yes	No
JNTUK	11 (100.0)	-	9 (81.8)	2 (18.2)	4 (36.4)	7 (63.6)	6 (54.5)	5 (45.5)
JNTUA	3 (42.8)	4 (57.2)	6 (85.7)	1 (14.3)	3 (42.9)	4 (57.2)	3 (42.9)	4 (57.2)
Total	14 (77.8)	4 (22.22)	15 (83.33)	3 (16.66)	7 (38.88)	11 (61.11)	9 (50)	9 (50)

(Figures in Parentheses indicate percentage)

100% of JNTUK Engineering college librarians are using CD-ROMs, 81.8% are using DVDs, 36.4% are using OCR, and 54.5% are using hard discs as storage devices. In case of JNTUA Engineering college librarians 42.8% are using CD-ROMs, 85.7% are using DVDs, 42.9% are using OCR, and 42.8% are using hard discs as storage devices to store the digital data of their libraries.

13. Retrieval of the Digital Collections in JNTU Engineering College Libraries

The retrieval system of digital collection of the JNTU Engineering college libraries is clearly shown in the Table 7. It is observed from the Table 8, JNTUK Engineering College libraries are depending on print documents (18.2%), preserved documents (72.7%), softwares (27.3%) and web (36.4%) for retrieving the digital collections. JNTUA Engineering college libraries are depending on print documents (28.6%), preserved documents (71.4%), software (14.3%) and web (42.9) for retrieving

the digital data of their libraries. Engineering College libraries are dependent on preserved documents to retrieve or recovery of the digital data in all JNTU Engineering colleges.

Table 7: *Retrieval of the Digital Collections in JNTU Engineering College Libraries*

n=18

	By Print Documents		By Preserved Documents		By Searching The Softwares		From Web	
	Yes	No	Yes	No	Yes	No	Yes	No
JNTUK	2(18.2)	9 (81.9)	8(72.7)	3(27.3)	3(27.3)	8(72.7)	4(36.4)	7(63.6)
JNTUA	2(28.6)	5(71.4)	5(71.4)	2(28.6)	1(14.3)	6(85.7)	3(42.9)	4(57.1)
Total	4(22.22)	14(77.8)	13(72.22)	5(27.8)	4(22.22)	14(77.8)	7(38.88)	11(61.11)

(Figures in Parentheses indicate percentage)

14. Access of Digital information

Table 8: *Access of Digital Information by Librarians of Engineering College Libraries of JNTU*

n= 18

	Through Internet		From CD-ROM/ DVDs		From Digital Library Software Package	
	Yes	No	Yes	No	Yes	No
JNTUK	8(72.7)	3(27.3)	6(54.5)	5(45.5)	3(27.3)	8(72.7)
JNTUA	5(71.4)	2(28.6)	5(71.4)	2(28.6)	2(28.6)	5(71.4)
Total	13(72.22)	5(27.8)	11(61.11)	7(38.88)	5(27.8)	13(72.22)

(Figures in Parentheses indicate percentage)

Majority (72.22%) of the librarians of JNTU Engineering colleges accessed the digital data through Internet followed by CD-ROM/ DVD (61.11%) and digital library software package (27.8%). The above said data clearly presented in the Table 8.

15. Globally Availability of Digital Information

The Table 9 presents the data about availability of digital information globally of engineering college libraries of JNTU. 63.6% of engineering college libraries allowed accessing their digital information for all users. 62.5% of engineering college libraries of JNTUK and 57.1% of JNTUA libraries did not allow the digital information of their own globally.

Table 9: *Globally Availability of Digital Information of JNTU Engineering College Libraries*

n=18

	Digital Information Globally Available	
	Yes	No
JNTUK	7(63.6)	4 (36.4)
JNTUA	3 (42.9)	4 (57.1)
Total	10(55.55)	8 (44.44)

(Figures in Parentheses indicate percentage)

Totally 47.1% of JNTU Engineering college libraries are permitting to access their digital information globally. But 52.9% are not allowing accessing the same.

16. The Users of the Digital Libraries of Engineering Colleges

Faculty and students are using 100% of Digital library services in JNTUH, JNTUK and JNTUA Engineering colleges. But only in 29.4% of colleges the non-teaching staff is also using the digital library services. This data is presented in Table 10.

Table 10: *Users of the Digital Libraries of JNTU Engineering Colleges*

n=18

| | Type of Users | | | | | |
| | Faculty | | Non-Teaching staff | | Students | |
	Yes	No	Yes	No	Yes	No
JNTUK	11 (100.0)	-	3 (27.3)	8 (72.7)	11 (100.0)	-
JNTUA	7 (100.0)	-	2 (28.6)	5 (71.4)	7 (100.0)	-
Total	18 (100.0)	-	5 (27.8)	13 (72.22)	18 (100.0)	-

(Figures in Parentheses indicate percentage)

17. Materials going to be digitalized

The researcher asked about the digitalization i.e. the type of materials which are going to be digitalized. The respondent librarians answered against the reading materials, Old question papers (70.6%), Newspaper clippings, and Faculty lectures (50%), Programs conducted by college authorities (47%), rare books (44.1%), old books (32.4%) and manuscripts (26.5%). From the data presented in the Table 11 is understood that the librarians are very much interested to digitalize the rare books, reading materials and old question papers.

18. Subscription of Consortia

Table 11: *Type of Materials going to be digitalized in Engineering College Libraries of JNTU*

n=18

| | Rare Books | | Old Books | | Reading Materials | | Programs Conducted by College | | Manuscripts | | Old Question Papers | | Newspaper Clippings | | Lectures of Faculty | |
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
JNTUK	3 (27.3)	8 (72.7)	2 (18.2)	9 (81.8)	8 (72.7)	3 (27.3)	4 (36.4)	7 (63.6)	3 (27.3)	8 (72.7)	7 (63.6)	4 (36.4)	4 (36.4)	7 (63.6)	4 (36.4)	7 (63.6)
JNTUA	5 (71.4)	2 (28.6)	2 (28.6)	5 (71.4)	4 (57.1)	3 (42.9)	3 (42.9)	4 (57.1)	2 (28.6)	5 (71.4)	2 (28.6)	5 (71.4)	5 (71.4)	2 (28.6)	3 (42.9)	4 (57.1)
Total	8 (44.4)	10 (55.5)	4 (22.22)	14 (77.77)	12 (66.7)	6 (33.33)	7 (38.88)	11 (61.11)	5 (27.77)	13 (72.22)	9 (50)	9 (50)	9 (50.0)	9 (50.0)	7 (38.88)	11 (61.11)

Only 36.4% of engineering college libraries of JNTUK is subscribing consortia. But 57.1% of JNTUA libraries are subscribing consortia. Totally only 38.2% of JNTU Engineering College libraries are tied up with different consortia. The following Table.12 presented the data regarding the same.

Table 12: *Subscription of Consortia by JNTU Engineering College Libraries*

n=18

| | Subscription of Consortia | |
	Yes	No
JNTUK	4 (36.4)	7 (63.6)
JNTUA	4 (57.1)	3 (42.9)
Total	8 (44.44)	10 (55.55)

(Figures in Parentheses indicate percentage)

19. Constraints in Digital Library Initiatives

The librarians who are working in the JNTU Engineering colleges are facing some problems while initiating to install the digital libraries in their respective Engineering colleges. The researcher presented the related data in the Table.13.

Table 13: Constraints in Digital Library Initiatives by Librarians of Engineering Colleges of JNTU

n=18

S. No.	Constraints in Digital Library Initiatives	JNTUK	JNTUA
1	Insufficient funds	07 (63.6)	04 (57.1)
2	Inability to absorb recurring costs	05 (45.4)	05 (71.4)
3	Initial cost is very high	10 (90.9)	07 (100.0)
4	Top management not interested	02 (18.2)	04 (57.1)
5	Lack of professional recognition	05 (45.4)	06 (85.7)
6	Library staff are not interested in Digital initiatives	05 (45.4)	06 (85.7)
7	Lack of adequate trained staff in digitization activities	05 (45.4)	06 (85.7)
8	Library staff are not interested in learning digitization activities	05 (45.4)	06 (85.7)
9	Legal problems (Copy right problems etc.)	11 (100.0)	07 (100.0)
10	Hacking	07 (63.6)	06 (85.7)
11	Virus effect	10 (90.9)	07 (100.0)
12	Delete and format of hard disk	04 (36.3)	07 (100.0)
13	Preservation problems	10 (90.9)	07 (100.0)

(Figures in Parentheses indicate percentage)

100% of JNTU librarians are facing the legal problems. The librarians of JNTUK Engineering colleges felt that "initial cost is very high" and "preservation" (90.9%) is also a problem for them. And also they have pointed that insufficient funds, hacking (63.6%) are also the major problems. 45.4% of librarians felt that inability to absorb recurring costs, lack of professional recognition, library staff are not interested in digital initiatives, lack of adequate trained staff in digitalization activities and also that they are not interested in learning. 36.3% are facing the problem of delete and format of hard disk and finally only 18.2% have answered against the problem that- "Top management not interested".

100% of JNTUA Engineering college librarians felt that initial cost is very high; virus problems, delete and format the hard disk and preservation are the major problems. 85.7% librarians felt that professional recognition, lack of adequate trained staff, and library staff are not interested in digitization activities. 71.4% are facing the problem of inability to absorb recurring costs. 57.1% are answered against insufficient funds, top management not interested.

20. Suggestions to Improve Digital Library Initiatives

Finally the librarians offered few suggestions to improve the digital library initiatives. The related data is presented in the Table 14 here under.

Table 14: Suggestions to Improve Digital Library Initiatives

S. No.	Suggestions to Improve DL Initiatives	JNTUK	JNTUA	Total
1	Adequate funds should be made to subscribe On-line journals from time to time.	11 (100.0)	07 (100.0)	18 (100)
2	Sufficient number of latest computers for users to use digital library and as well as Internet	05 (45.4)	05 (71.4)	10 (55.55)
3	The library should procure software which will be capable of meeting the Digital Library's as well as user's requirements	11 (100.0)	07 (100.0)	18 (100)
4	There is need for trained and skilled professional staff to shoulder the responsibility of the IT operations and services should be undertaken	10 (90.9)	06 (85.7)	17 (94.44)
5	Need for periodic In service training of staff in handling latest techniques.	11 (100.0)	07 (100.0)	18 (100)

(Figures in Parentheses indicate percentage)

100% of librarians of JNTU Engineering colleges have suggested that adequate funds should be used to subscribe On-line journals from time to time and accepted that –

i. The library should procure software which will be capable of meeting the Digital Library's as well as user's requirements.
ii. There is need for trained and skilled professional staff to shoulder the responsibility of the IT operations and services should be undertaken.
iii. There is need for periodic in service training of staff in handling latest techniques.

But 55.55% of librarians have suggested that sufficient number of latest computers are required for users to use digital library and as well as Internet.

21. Results and Discussions

- 81.81% of engineering colleges are providing Digital library facility. (Table 2)
- 94.44% of engineering college libraries of JNTU acquiring digital collection from Internet. (Table 4)
- In case of print documents 44.44% of librarians of JNTU affiliated Engineering colleges are digitalizing their documents by typing, 33.33% are by scanning and 22.22% are using both the methods. In case of Audio visuals 50% are using digital camera, 27.7% are using web camera and 22.22% librarians are using both the cameras for digitalizing their documents. (Table 5)
- 77.8% of librarians are using CD-ROMs and 83.33% are using DVDs as storage devices. (Table 6)
- Majority (greater than 70%) of JNTU Engineering College libraries are depending on preserved documents to retrieve or recovery of the digital data. (Table 7)
- Majority (greater than 70%) of the librarians of JNTU Engineering colleges accessed the digital data through Internet followed by CD-ROM/ DVD (61.11%) and digital library software package (27.8%). (Table 8)
- 55.55% of JNTU Engineering college libraries are permitting to access their digital information globally. But 44.44% are not allowing accessing the same. (Table 9)
- Faculty and students are using the Digital library services in 100% of JNTUK and JNTUA Engineering colleges. But only in 27.8% of colleges the non-teaching staff is also using the digital library services. (Table 10)
- The librarians are very much interested to digitalize the rare books, reading materials and old question papers for their libraries. (Table 11)
- 44.44% of JNTU Engineering college libraries are tie up with different consortia. (Table 12)

- The librarians of JNTU Engineering colleges are facing different problems while installing the digital libraries. (Table 13)
- The librarians of JNTU Engineering colleges offered some suggestions towards the improvement of the Digital library initiatives. (Table 14)

22. Hypotheses Testing

i. There is consensus among engineering colleges in developing a policy for establishing a digital library. The librarians gave different suggestions to improve the Digital Library initiatives among JNTU Engineering college libraries. Hence the hypothesis is partially proved. (Table 14)

ii. There are constraints in establishing a digital library among engineering colleges in A.P. (Table 13)

23. Conclusion

From the findings of the study majority of the JNTU affiliated Engineering Colleges are taking steps towards installation of digital libraries. The librarians of JNTU Engineering colleges are facing different problems while installing the digital libraries. Planning a digital library requires thoughtful analysis of the organization and its users, and an acknowledgement of the cost and the need for infrastructure and ongoing maintenance.

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