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BSC-INFORMATION SCIENCE: NEED, VALUE WITH SPECIAL REFERENCE TO A PROPOSED CURRICULUM WITH MULTI ENTRY AND MULTI EXIT SYSTEM

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ABSTRACT

Information Science [IS] is one of the important valuable domains in the field of Applied Science. This is an interdisciplinary domain with so many focuses like Information Collection, selection, organization, processing, management and dissemination. The concept and scenario of earlier and today's Information Science [IS] is totally different. Information Science [IS] programme is comes with so many degree and level around the world. But in India, nomenclature of Information Science [IS] with Bachelor Degree is still not available. Thus this paper is talks about India's First proposed Degree i.e. BSc- Information Science [IS] with its proposed paper, credits, and electives, practical and theoretical requirement and so on. However, before of all these, the general role of Information Science [IS], characteristics illustrated briefly.

Keywords: Information, Informatics, Information Systems, Information Science, BSc- Information Science, MSc- Information Science, Academic Discipline, Technical Education, Techno-Social Streams, Dual Specialisation

INTRODUCTION

Information Science [IS] is a domain which is closely related with so many domains such Computing, Information Technology, and Documentation Science and so on. Information Science is responsible for so many information activities such as collection, selection, organization, management, processing, and dissemination of information and similar type of content. Information Science programmes are available around the world; but it is popular and commonly available in so many US based countries and states. Information Science around the World mainly popular in Master's Degree i.e. MSc- Information Science nomenclature; however today several domain of Information Science are also available in Information Science universities and or department. This paper, talks about specialization of emerging Information Science tools and technologies where as in Third Year is domain based Information Science specialization is proposed[04, 05, 12].

HYPOTHESES

For several aim and objective this paper and study s conducted which includes, but not limited to as follows:-

- To Know basic about Information Science or IS domain including its characteristics, nature and role;
- To know Information Science its need is several domain and institutions and emerging trend;
- To learn about Information Science Degree programme around the world and specially in India;
- To proposed Information Science programme with BSc Degree;
- To find out new specialization in Information Science and new proposed domain;
- To learn main benefit of proposed BSc- Information Science Degree.

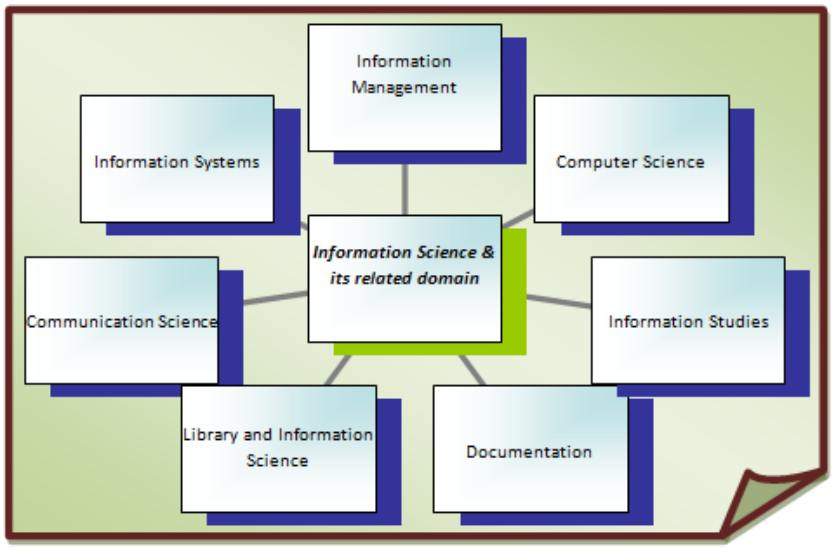

Fig: 1. Depicted some information dealing but technology focused subjects

Is Information Science a Computing Domain?

Information Science is mistakenly considered as Computer Science or Information Technology; though it is a broad domain and discipline combined with so many subjects such as Computer Science, Information Technology, Management Science, Cognitive Science, and Information Studies and so on for Information Processing and Management. The curriculum of Information Science is integrated with so many gradients and mainly focuses on Computing. As today Information needs several activities involve with processing, management and dissemination; thus Intelligent Information Systems requires Computing and IT gradients [12]. So, today's Information Science is looks like Computing domain but it is a Broader than that and deals as Information Domain with so many focuses such as Information Management, Technology Management, Media and Communication

Management, Library Management and so on. Information is actually important domain and needed for so many domains such as Education, Health, Commerce and Business Houses, Social Work and so on[13, 14, 15]. Thus, so many domains created by integration of Information Science and out of such domain some important are- Health Information Science, Business Information Science/ Informatics, Chemical Information Science, Geo Information Science are among the popular domain of Information Science.

Information Science: World and Indian Account

In early period, Information Science comes with so many nomenclatures such as Documentation Science, Information Studies, Library and Information Science and so on. Though the development and integration of Technologies with Information Science changes the entire curriculum of the programme and so many aspects of and facets are included such as Database Technologies, Web Technologies, Multimedia Technologies, Data warehouse Technologies, Networking and Communication Technologies and so on. However, such gradients are uses in several Information activities; like Information Processing and Management and ultimately directly. However, in United States Computing and Technologies curriculum much more enriched in Information Science, than that of UK, France, Germany and European countries. MSc- Information Science is a flagship programme and available in Information Science departments or newly evolved Information Schools or I-Schools [16, 17, 18].

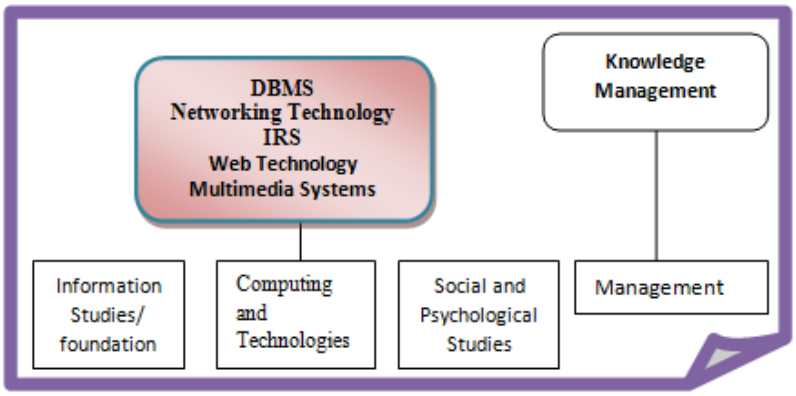

Fig: 2. Knowledge World of Information Science

In India, Information Science is available only in 6-7 institutes such as BIT-Mesra, IEM-Saltlake, KITM-Buniadpur, Techno India- Hooghly, Dr. BC Roy Engineering College-Durgapur DATM-Jalpaiguri and so on. The common programme is MSc- Information Science. Though still BSc- Information Science, MPhil- Information Science programme in Indian Scenario with 3 year duration.

BSc- Information Science: The Proposed Features of the Programme

Information Science or IS in this proposed programme comes with Three Year duration; it is proposed in Indian scenario. In the proposed Information Science programme First Year is deals with Manual Information Science aspects; while in 2nd Year comes some Information Technology and Computing programme and interdisciplinary Programme. Here it is proposed that Students may be offer a Diploma in Information Science and Computing after

2nd year and similarly it is proposed to give Lateral Entry Opportunity in 2nd year with Diploma in Library Science/ Information Science/ Computer Technology and allied programme related to Information Science; however provided the Eligible candidate should come with 1 Year course and similar type of Credits or Learning Hours [01, 02, 33, 34].

The proposed programme combines One year with two semester and thus total six semester makes Information Science BSc Degree. In Second Year i.e. 4th Semester proposed curriculum deals with tools and technological aspects while in 3rd Year a domain based Information Science is offered/ proposed. There are so many domains based Information Science like Health Information Science/ Geo Information Science/ Chemo Information Science and so on; but here proposed BSc- Information Science comes with Health Informatics/ Information Science and Geo-Informatics/ Information Science specialization and electives are listed in Fig. 4.

Here each year total 5 papers are proposed and each deals with 2 credits; where 1 credit deals with 30 Hours of teaching and learning activities. In Second Year a list of Technology aspects papers are offered which are separately listed in Figure-5. Here practical dealing subjects are proposed with 'P' tag and Theory related subjects are tagged as 'T'. Need of separate department is also mentioned to teach any spatial subject, if needed. However, in todays age I-Schools deals with so many intellectuals and thus; it may not require to offer in other department or Schools [01, 04, 34].

BSc- Information Science: The Proposed Programme Structure in Indian Academic Scenario

Following is the list of proposed BSc-Information Science programme with Multi Entry and Multi Exist option:-

Semester-1/Year-1	Credit	Practical Requirement	In-House Possibilities and Requirement of Offering in other departments, if needed
Information and Knowledge Science	2	'T'	----
IT and Systems	2	'P'	IT/ Computer Science
Computing and Domain Based IT	2	'P'	IT/ Computer Science
Knowledge Organization	2	'T'	----
Information Seeking Behaviors and Cognitive Approach	2	'T'	----

Fig: 3/A. Proposed Curriculum-Semester-1

Semester-II/Year-1	Credit	Practical Requirement	In-House Possibilities and Requirement of Offering in other departments, if needed
Management Science	2	'T'	Management Science/ Commerce Department
Knowledge Organization-II	2	'P'	-------
Information Analysis, Consolidation & Repackaging	2	'P'	-------

Digital, Information and Network Divide	2	'T'	-------
Database and Web Systems	2	'P'	IT/ Computer Science

Fig: 3/B. Proposed Curriculum-Semester-II

Semester-1II/Year-2	Credit	Practical Requirement	In-House Possibilities and Requirement of Offering in other departments, if needed
MIS and Systems	2	'T'	-------
Technical Writing	2	'P'	-------
Networks & Information Networks	2	'P'	IT/ Computer Science
Knowledge Management	2	'T'	-------
Cloud Computing	2	'P'	IT/ Computer Science/CISCO Lab

Fig: 3/C. Proposed Curriculum-Semester-III [Entry is possible with Diploma in LS/IT/IS in III semester

Semester-1V/Year-2	Credit	Practical Requirement	In-House Possibilities and Requirement of Offering in other departments, if needed
Please See Figure 5	2	'P'	IT/ Computer Science
Please See Figure 5	2	'P'	IT/ Computer Science
Please See Figure 5	2	'P'	IT/ Computer Science
Please See Figure 5	2	'P'	IT/ Computer Science
Please See Figure 5	2	'P'	IT/ Computer Science

Fig: 3/D. Proposed Curriculum-Semester-IV [Exit with Diploma in Information Science and Computing, if needed]

Semester-V/Year-3	Credit	Practical Requirement	In-House Possibilities and Requirement of Offering in other departments, if needed
Information Systems	2	'T'	-------
Advance Networking	2	'P'	IT/ Computer Science
Advance Database	2	'P'	IT/ Computer Science
Semantic Web and Future Informatics	2	'P'	--------
Knowledge Society & Economy	2	'T'	-------

Fig: 3/E. Proposed Curriculum-Semester-V

Semester-VI/Year-3	Credit	Practical Requirement	In-House Possibilities and Requirement of Offering in other departments, if needed
Please See Figure 4	2	Depends Upon Electives	Depends Upon Electives
Please See Figure 4	2	Depends Upon Electives	Depends Upon Electives
Please See Figure 4	2	Depends Upon Electives	Depends Upon Electives
Please See Figure 4	2	Depends Upon Electives	Depends Upon Electives
Theses/Dissertation	4	Depends Upon Electives	Depends Upon Electives

Fig: 3/F. Proposed Curriculum-Semester-VI

Elective for Semester-IV- Domain Based-Geo Informatics[5 Papers need to select out of these]	Elective for Semester-IV- Domain Based-Health Informatics[5 Papers need to select out of these]
Geo Informatics and Related Domain Geo Science and Technology [Geo Metric Networks] Geo Metrics and Environmental Monitoring Topography and Map studies Geo Informatics and Statistics CAD with 1D and 3D Features	Medical Information Science [Basic] Hospital Management and Computing MIS- Stakeholdes MIS and Advance Computing Medical Information Networking and Digitalization Human Anatomy

Fig: 4. Showing Domain Based Specialization need to choose in VI semester [18, 21, 27]

Elective for Semester-VI- Technology Based [5 Papers need to select out of these]	Elective for Semester-VI- Technology Based [5 Papers need to select out of these]
Elective 1-Data and Database Elective 2-Oracle 11i Elective-3-SQL and Microsoft Elective-4-Multimedia DBMS Elective-5-Distributed DBMS and Data Mining Elective-6-ERP and Data warehousing Elective-7-Data Analysis and Information Intelligence	Elective 1- Basics of Web and Usability Engineering Elective 2-Human Computer Interaction through Usability Engineering Elective-3-Web Information Systems Elective-4-Usability Practice-Dynamic Web Development Elective-5-AJAX, PHP, Mobile Interface Designing Elective-6-Intelligent Interface Elective-7-Trends in HCI and Information World

Fig: 5. Showing Technology Based Specialization need to choose in IV semester [28, 29]

FINDINGS

- Information Science is most interdisciplinary domain and comes with so many domains like computing, management science, cognitive science, information studies and so on;
- Information Science is also biased with so many domain such as Geo Science, Chemical Science, Health Science and so on;
- In India, Information Science is mainly offers with MSc- Information Science nomenclature and still MPhil- Information Science, BSc- Information Science are not available in Indian University.

SUGGESTION

- Information Science is need to offers with BSc Degree to cater such audience;
- Information Science programmes need to offer with 21st century approach and thus need to offer in so many specialization like Web Systems, DBMS, Cloud Computing and so on;
- The programme may be offered in IT, Computer Science and similar departments, if universities not having Information Science departments.

CONCLUSION

The proposed programme is comes with possible output and exist scheme. Thus students who exist One Year programme may handle general knowledge Organization practice and handle general Information aspects with Basic IT operation. After 2nd Year one receives Diploma in Information and Computing; and comes with specialization; thus the pass out may join Computing Job along with Knowledge Organization job possibilities and opportunities. Information Science programme in today's age need so may nomenclature like Western Trends and may be offered with Information Science and Engineering and Information Science and Computing Degree or Information Science with domain based specialization [01, 03, 28, 33].

REFERENCES

1. Cohen, E. B. (2004). Applying the Informing Science Framework to Higher Education: Knowledge Development, Management, and Dissemination. Konferencja Pozyskiwanie wiedzy i zarządzanie wiedzą (Proceedings of the Knowledge Acquisition and Management Conference) May 13-15, 2004 Kule, Poland.
2. Cohen, Eli B. and Nycz Malgorzata (2006). Learning Objects and E-Learning: an Informing Science Perspective. Interdisciplinary Journal of Knowledge and Learning Objects Volume 2, 2006
3. Martin, S.B. (1998). Information technology, employment, and the information sector: Trends in information employment 1970–1995. Journal of the American Society for Information Science, 49(12), 1053–1069.
4. Michael Buckland and Ziming liu (1995).History of information science. Annual Review of Information Science and Technology vol. 30: 385-416.
5. Paul, Prantosh Kumar, Dipak Chaterjee and Bhaskar Karn "Information Science Education and Research: emphasizing contemporary Indian scenario- an overview" in **IEM/IEEE** sponsored international conference proceedings (IEMCON-12). P-349-353. [indexed, abstracted in Google Scholar[USA], Cite Ceer, EBSCO]
6. Paul, Prantosh Kumar**,** B B Sarangi, "**I**nformation **S**cience (**IS**)**:** Emerging utilization of Computing, Technology and Management Gradients in the 21st Century". in Procedings of National Conference on Emerging Trends in Computer Application & Management[NCETCAM-12], AVIT, VM University, 24-25/02/12, GK Publisher, Chennai, Page-138-142, ISBN-978-93-81208-04-5
7. Paul,Prantosh Kumar, D Chaterjee, R Bhatbagar,SK Jena,B B Sarangi, B Karn 'Information and Knowledge Management(IKM): Formal and Computing Approach emphasizing Academic Programme in Indian Perspective' Published in Procedings of National Confernce of ETICT,13-14/09/2012, SRM University,Chennai, TN,India, ISBN-978-81-908341-2-4, Page-127-131, Bhagvan Printers, Chennai
8. Paul,Prantosh Kumar, D Chaterjee,R Bhatnagar, Uma Pricilda "Information Scientist: Contemporary innovative techno management roles with special reference to Information Scientist Vs Information Technologist: A Study" , Indian Journal of Information Science and Applications [IJISA], Vol. 2. No. 1, Jan-Jun-2012, Academic Research Publication, New Delhi, Page-47-50, ISSN-2249-3689

9. Prantosh Kumar Paul , Dipak Chaterjee , K V Sridevi , K L Dangwal , "Computer and Information Science (CIS) Education in the Universities of India: Emphasizing Central Universities – A Brief Study" in International Journal of Marketting and Trade Policy , Page-277-284, July-Dec, 2012,ISSN-0975-6132 Serials Publications, New Delhi, India. Chief Editor- P Arunachallan, CUSAT. Kerala

10. Prantosh Kumar Paul, Dipak Chaterjee, N R Bandyopadhyay, K V Sridevi, K L Dangwal, Sarmistha Choudhury "Information Science: Past, Present and Future in Indian Perspective" " in International Journal of Computational Intelligent Theory and Practice, ISSN: 0973-5267 July-Dec, 2012, Serials Publications, New Delhi, India

11. Prantosh Kr. Pau1, Minakshi Ghosh **"**Information Science & Technology (IST): Need of New Age Information Centric and Technology & Engineering Dependent Academic Programme for Building Virtualized & Green-Eco Friendly Information Infrastructure" International Journal of Computer Science and System Analysis, Page-153-157, Vol. 6, No. 2, July-Dec. 2012,SP, ISSN-0973-7448 Chief Editor-NS Chaudhari, NTU, Singapore

12. Prantosh Kr Paul , K V Sridevi, Minakshi Ghosh "Information Science: From Fundamental to Contemporary Scenario" International Journals of Mathematics and Engineering with Computers, Vol. 3. No.2, July-Dec. 2012, ISSN-2230-8911, Page- 73-78, International Science Press, Haryana, India, EIC- R Panalagusamy, Tamilnadu

13. Prantosh Kr Paul , K V Sridevi, "Information Science (IS) Education: Challenges, Issues and Opportunities in Indian context" International Journals of Mathematics and Engineering with Computers, Vol. 3. No.2, July-Dec. 2012, ISSN-2230-8911, Page-87-93, International Science Press, Haryana, India, EIC- R Panalagusamy, Tamilnadu

14. Prantosh Kr. Paul, "Information Science and its increasing scope and utilization in Geo Sciences for sophisticated Sustainable Development" International Journals of Neural Networks and Applications, ISSN-0974-6048, Vol. 5, No. 2, Page-85-89, International Science Press, Haryana, India, EIC- Angela Slavoa, IMI-BASc, Bulgaria

15. Prantosh Kr. Paul, "Information Science (IS) and Information Technology (IT): Fundamentals emphasizing Comparative Study" International Journal of BSP [IJBSP], Vol. 3, No. 1, January-Dec-2012, ISSN-0975-8186, Page-33-37, International Science Press, Haryana, India, EIC-N Sriraam, SSN College, Chennai, India

16. Prantosh Kr. Pau1, H A Mangla, B B Sarangi, Bhaskar Karn Ramanna Chetri "Mathematical Sciences and its increasing interaction and utilization in Information Centric Traditional Information Sciences (IS)" International Journal of ESST, Vol. 2, No. 1-2, July-Dec-2012,Page-27-34, ISSN- , International Science Press, India Chief Editor- N Karmegam, TN, India

17. Prantosh Kr. Pau1, R Senthamarai, K S Shivraji, D Chatterjee B Karn "Artificial Intelligence and Expert Systems: its emerging interaction and importance in Information Science- An overview" Asian Journal of Electrical Sciences, Vol. 1. No. 2, July-Dec. 2012, ISSN-2249-6297,Page- 06-10, The Research Publication, Coimbatore, India, EIC-Hebba Hassan, Oman

18. Prantosh Kumar Paul, Ashok Kumar, Dipak Chaterjee " Health Informatics and its Practice: Emerging Domain of Information Science-Indian Scenario" in Current Trends

in Biotechnology and Chemical Research, Vol. 2 No. 2, July-Dec, 2012, Page- 83-87, ISSN-2249-4073 *[Indexed in DOAJ, Index Copernicus, Google Scholar, CAS-USA]*

19. Prantosh Kumar Paul, Dipak Chaterjee, BB Sarangi, B Karn "Mathematics & statistics: emphasizing its application and utilization in the working & Academic area of information science (IS)-contemporary scenario" In National Confernce on Mathematical Modeling and Simulation, ISBN-978-93-81274-45-3 VMKVEC, VM University, TN, India, Page- 80-86, Feb. 2012

20. Paul, Prantosh Kumar, Dipak Chaterjee and Bhaskar Karn "Information Science Education and Research: emphasizing contemporary Indian scenario- an overview" in International Journal of Management and Technology, Page-54-58, ISSN-2296-6611, January-2012, Vol. 2, No. 1, IEM, Kolkata.

21. Paul,Prantosh Kumar , D Chatterjee, M Ghosh "Medical Information Science: Emerging Domain of Information Science and Technology (IST) forsophisticated Health & Medical Infrastructure Building — An Overview" in International Scientific Journal of Sports Science, Vol.1 No. 2, July-Dec, 2012, Page-97-104, ISSN-2277-2804, New Delhi Publisher, New Delhi.

22. Paul,Prantosh Kumar, M K Ghose, "Cloud Computing: Possibilities, Chalenges, and opportunitities with special reference to its emerging need in the academic and working area of Information Science", ICMOC, Procedia Engineering, 38 [2012], Page-2222-2227, DOI-10.1016/j.proeng.2012.6.267, 1877-7058 C- Published by- Elsevier,USA,

23. Paul, Prantosh Kumar, R Rajesh, S Govindarajan, Uma Pricilda J, "Information Science: Contemporary subject scope and periphery with special reference to Global influence in India" International Journal of Image Processing and Applications" Vol. 3, No. 2, July-Dec. 2012, ISSN- 0975-8178, Page- 63-68, International Science Press, Haryana, India

24. Paul, Prantosh Kumar, " Service Science Nature in Information Science|: Overview" in Abhinav National Journal of Commerce and Management, April, 2013, Vol. 2, No. 4, Page-176-181, ISSN-2277-1166 Impact Factor 0.5051(2011), 0.9670 (2012) GISI

25. Paul,Prantosh Kumar ,R Rajesh,D Chaterjee, R Senthamarai , A Kumar, S Chaterjee "Usability Engineering: Contemporary Overview with specialreference to its possible & emerging utilisation in the academic and industrial field of Information Science (IS)" Journal of Emerging Technology in Mechanical Science and Engineering, Vol. 4, No. 1, March, 2013, ISSN-0976-2558, NI University, Kanyakumai, TN, India

26. Paul, Prantosh Kumar, "Information Science and Technology [IST] and its comparision with Information Technology and Social Computing" in Abhinav National Journal of Science and Technology, March, 2013, Vol. 2, No. 3, ISSN-2277-1174, Page-17-25, Impact Factor - 0.1210(2011), 0.2807(2012), GISI

27. Paul, Prantosh Kumar,A K Sharma, Jhuma Ganguly, M Ghosh, "Medical Information Science: Overview and a model curriculum of MSc-Information Science [Medical Information Science]" Submitted for Current Trends in Biotechnology and Chemical Research, Vol. 3 No. 1, ISSN-2249-4073, Page-50-54 *[Indexed in DOAJ, Index Copernicus, Google Scholar, CAS-USA]*

28. Paul, Prantosh Kumar "MSc Information Science with Possible Computing Specialization: An Analytical Study" International Journal System Simulation, Vol.7 No.2 July-December 2013, pp.60-67, Serials Publications

29. Paul, Prantosh Kumar "MSc-Information Science: A Deep Study of the Proposed Specialized Curriculum in Indian Scenario" in International Journal of Intelligent Information Processing -IJIIP, Vol.7 No.2 July-December 2013, pp.90-98

30. Paul, Prantosh Kumar, "Service Science [SS]: Emphasizing Role of Information Science [IS] as Service Science" Journal of Information Technology and Engineering, Vol.4 No.2 July-December 2013, pp.61-65, International Science Press

31. Paul, Prantosh Kumar, Jhuma Ganguly, M Ghosh "Chemo Informatics: the Healthy Results of Information Science and Chemical Science Integration" International Journal of Computer Science Systems Engineering and Information Technology- IJCSSEIT, Vol.6 No.2 July-December 2013, pp.92-96, Serials Publications

32. Paul, Prantosh Kumar, KL Dangwal, D Chatterjee "Information Science: Emphasizing Analytical Study of Educational Programmes in India" Vol.6 No.2 July-December 2013, pp.97-102, I International Journal of Neural Network Applications- JNNA, International Science Press

33. Paul, Prantosh Kumar, "Information Science: Design and Development of sophisticated MSc [IS] programme lies on Information and Technology" International Journal of Computer Science and Knowledge Engineering- IJCSKE, Vol.7 No.2 July-December 2013, pp-121-126, Vol.7 No.2 July-December 2013, pp-121-126

34. Paul, Prantosh Kumar "MSc-Information Science: A Five year proposed Multiple Exit programme for healthy Information Infrastructure Building" Global Research Analysis-An International Indexed Journal, Vol. 2, No. 11, Novermber, 2013, ISSN-2277-8160, Page-119-121. IF-0.2714

35. Reichman, F. (1961). Notched Cards. In R. Shaw (Ed.), The state of the library art04(01), pp. 11–55). New Brunswick, NJ: Rutgers, The State University, Graduate School of Library Service.

36. Saracevic, T. (1996). Relevance reconsidered. Information science: Integration in perspectives. In Proceedings of the Second Conference on Conceptions of Library and Information Science (pp. 201–218), Copenhagen, Denmark: Royal School of Library and Information Science.

37. Saracevic, T. (1975). Relevance: A review of and a framework for the thinking on the notion in information science. Journal of the American Society of Information Science, 26(6), 321–343.

38. Saracevic, T. (1979a). An essay on the past and future of information science education. I. Historical overview. Information Processing &Management, 15(1), 1–15.

39. Saracevic, T. (1979b). An essay on the past and future of information science education. II. Unresolved problems of 'extemalities' of education Information Processing & Management, 15(4), 291–301.

40. Vakkari, S.P. (1996). Library and information science: Content and scope. In J. Olaisen, E. Munch-Petersen, & P. Wilson (Eds.), Information science: From development of the discipline to social interaction. Oslo, Norway: Scandinavian University Press.

41. Vickery, B.C., & Vickery, A. (1987). Information science in theory and practice. London: Butterworths.

42. Wersig, G., & Neveling, U. (1975). The phenomena of interest to information science. Information Scientist, 9, 127–140.

43. White, H.D., & McCain, K.W. (1997). Visualization of literatures. Annual Review of Information Science and Technology, 32, 99–168.

44. www.en.wikipedia.org

45. www.infosci.cornell.edu/

46. www.ischools.org

47. http://www.libsci.sc.edu/bob/istchron/iscnet/ischron.html