Introduction to Information Science

LIS 104

University of Ibadan Distance Learning Centre
Open and Distance Learning Course Series Development

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General Editor: Prof. Bayo Okunade

University of Ibadan Distance Learning Centre
University of Ibadan,
Nigeria

Telex: 31128NG

Tel: +234 (80775935727)
E-mail: ssu@dlc.ui.edu.ng
Website: www.dlc.ui.edu.ng

Vice-Chancellor's Message

The Distance Learning Centre is building on a solid tradition of over two decades of service in the provision of External Studies Programme and now Distance Learning Education in Nigeria and beyond. The Distance Learning mode to which we are committed is providing access to many deserving Nigerians in having access to higher education especially those who by the nature of their engagement do not have the luxury of full time education. Recently, it is contributing in no small measure to providing places for teeming Nigerian youths who for one reason or the other could not get admission into the conventional universities.

These course materials have been written by writers specially trained in ODL course delivery. The writers have made great efforts to provide up to date information, knowledge and skills in the different disciplines and ensure that the materials are user-friendly.

In addition to provision of course materials in print and e-format, a lot of Information Technology input has also gone into the deployment of course materials. Most of them can be downloaded from the DLC website and are available in audio format which you can also download into your mobile phones, IPod, MP3 among other devices to allow you listen to the audio study sessions. Some of the study session materials have been scripted and are being broadcast on the university's Diamond Radio FM 101.1, while others have been delivered and captured in audio-visual format in a classroom environment for use by our students. Detailed information on availability and access is available on the website. We will continue in our efforts to provide and review course materials for our courses.

However, for you to take advantage of these formats, you will need to improve on your I.T. skills and develop requisite distance learning Culture. It is well known that, for efficient and effective provision of Distance learning education, availability of appropriate and relevant course materials is a *sine qua non*. So also, is the availability of multiple plat form for the convenience of our students. It is in fulfilment of this, that series of course materials are being written to enable our students study at their own pace and convenience.

It is our hope that you will put these course materials to the best use.

Prof. Abel Idowu Olayinka

Vice-Chancellor

Foreword

As part of its vision of providing education for "Liberty and Development" for Nigerians and the International Community, the University of Ibadan, Distance Learning Centre has recently embarked on a vigorous repositioning agenda which aimed at embracing a holistic and all encompassing approach to the delivery of its Open Distance Learning (ODL) programmes. Thus we are committed to global best practices in distance learning provision. Apart from providing an efficient administrative and academic support for our students, we are committed to providing educational resource materials for the use of our students. We are convinced that, without an up-to-date, learner-friendly and distance learning compliant course materials, there cannot be any basis to lay claim to being a provider of distance learning education. Indeed, availability of appropriate course materials in multiple formats is the hub of any distance learning provision worldwide.

In view of the above, we are vigorously pursuing as a matter of priority, the provision of credible, learner-friendly and interactive course materials for all our courses. We commissioned the authoring of, and review of course materials to teams of experts and their outputs were subjected to rigorous peer review to ensure standard. The approach not only emphasizes cognitive knowledge, but also skills and humane values which are at the core of education, even in an ICT age.

The development of the materials which is on-going also had input from experienced editors and illustrators who have ensured that they are accurate, current and learner-friendly. They are specially written with distance learners in mind. This is very important because, distance learning involves non-residential students who can often feel isolated from the community of learners.

It is important to note that, for a distance learner to excel there is the need to source and read relevant materials apart from this course material. Therefore, adequate supplementary reading materials as well as other information sources are suggested in the course materials.

Apart from the responsibility for you to read this course material with others, you are also advised to seek assistance from your course facilitators especially academic advisors during your study even before the interactive session which is by design for revision. Your academic advisors will assist you using convenient technology including Google Hang Out, You Tube, Talk Fusion, etc. but you have to take advantage of these. It is also going to be of immense advantage if you complete assignments as at when due so as to have necessary feedbacks as a guide.

The implication of the above is that, a distance learner has a responsibility to develop requisite distance learning culture which includes diligent and disciplined self-study, seeking available administrative and academic support and acquisition of basic

information technology skills. This is why you are encouraged to develop your computer skills by availing yourself the opportunity of training that the Centre's provide and put these into use.

In conclusion, it is envisaged that the course materials would also be useful for the regular students of tertiary institutions in Nigeria who are faced with a dearth of high quality textbooks. We are therefore, delighted to present these titles to both our distance learning students and the university's regular students. We are confident that the materials will be an invaluable resource to all.
We would like to thank all our authors, reviewers and production staff for the high quality of work.

Best wishes.

Professor Bayo Okunade

Director

Course Development Team

Content Authoring	Folorunso, O.O
Content Editor	Prof. Remi Raji-Oyelade
Production Editor	Ogundele Olumuyiwa Caleb
Learning Design/Assessment Authoring	SchulPortal Technology
Managing Editor	Ogunmefun Oladele Abiodun
General Editor	Prof. Bayo Okunade

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Study Session 1: Information and Related Terms

Expected duration: 1 week or 2 contact hours

Source:*http://1.bp.blogspot.com/pTTMX8G1Yo0/TzCiZlwQDXI/AAAAAAABY/45EPcI11Joo/s1600/info+prod.jpg*

Introduction

Many students use the terms "data" and "information" interchangeably as if they imply the same meaning. In as much as the two are closely related and information is more often defined with reference to data, in certain situations, information is defined completely without recourse to data.

Furthermore, there are other related terms which some students pretend they know how they relate to information while others believe they are not even related. The following lecture will give a highlight of the concept of information and how it is related to some other key terms.

Learning Outcomes for Study Session 1

At the end of this study session, you should be able to:

1.1 Define Information

1.2 Explain the relationship between Data and Information

1.1 Definition of Information

Information are data that is accurate and timely, specific and organized for a purpose, presented within a context that gives it meaning and relevance, and can lead to an increase in understanding and decrease in uncertainty.

Information is valuable because it can affect behavior, a decision, or an outcome. For example, if a manager is told his/her company's net profit decreased in the past month, he/she may use this information as a reason to cut financial spending for the next month. A piece of information is considered valueless if, after receiving it, things remain unchanged.

Information is a stimulus that has meaning in some context for its receiver. When information is entered into and stored in a computer, it is generally referred to as data. After processing (such as formatting and printing), output data can again be perceived as information.

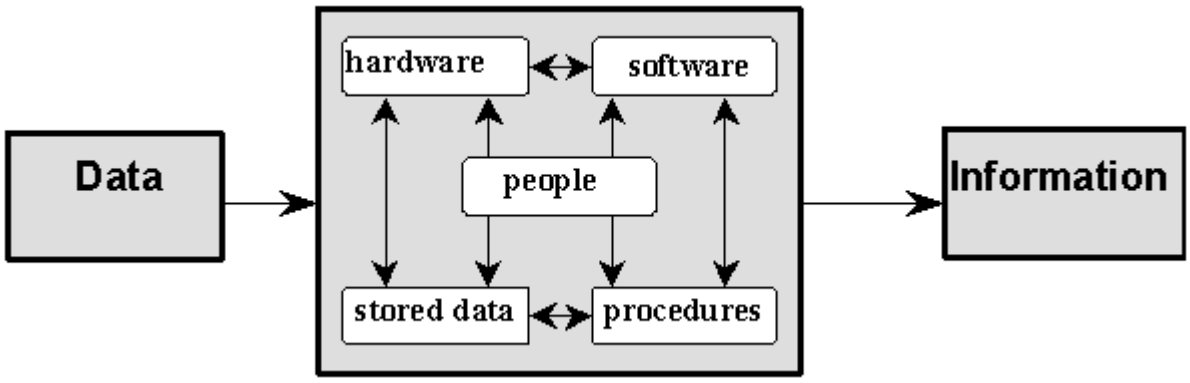

Figure 1.1: *Information Analysis*
Source: *http://www.informationr.net/ir/9-4/p191fig5.gif*

1.1.1 Information Retrieval and the Concept of Information

The term Information Retrieval (IR) is possibly one of the most important terms in the field known as information science. A critical question is thus, why, and in what sense, IR uses the term information. IR can be seen both as a field of study and as one among several research traditions concerned with information storage and retrieval.
Although the field is much older, the tradition goes back to the early 1960s and the Cranfield experiments, which introduced measures of recall and precision. Those experiments range among the most famous in IS and continue today in the TREC experiments. This tradition has always been closely connected to document/text retrieval, as stated by van Rijsbergen (1979, p. 1):

Unfortunately the word information can be very misleading. In the context of information retrieval (IR), information, in the technical meaning given in Shannon's theory of communication, is not readily measured (Shannon and Weaver).
In fact, in many cases one can adequately describe the kind of retrieval by simply substituting 'document' for 'information'. Nevertheless, 'information retrieval' has become accepted as a description of the kind of work published by Cleverdon, Salton, Sparck Jones, Lancaster and others.
A perfectly straightforward definition along these lines is given by Lancaster: 'Information retrieval is the term conventionally, though somewhat inaccurately, applied to the type of activity discussed in this volume. An information retrieval system does not inform (i.e. change the knowledge of) the user on the subject of his inquiry.
It merely informs on the existence (or non-existence) and whereabouts of documents relating to his request.' This specifically excludes Question-Answering systems as typified by Winograd and those described by Minsky. It also excludes data retrieval systems such as used by, say, the stock exchange for on-line quotations." (Notes to references omitted).
In 1996, van Rijsbergen and Lalmas (p. 386), however, declared that the situation had changed and that the purpose of an information retrieval system was to provide information about a request.
Although some researchers have fantasized about eliminating the concept of document/text and simply storing or retrieving the facts or "information" contained therein, it is our opinion that IR usually means document retrieval and not fact retrieval.
You shall return to the difference between documents and facts later, but here we want to show why information (and not, for example, document, text, or literature) was chosen as a central term in this core area. Ellis (1996, pp. 187-188) describes "an anomaly" in IS:
Brookes noted the anomaly could be resolved if information retrieval theory were named document retrieval theory which would then be part of library science. However, he commented that those working in the field of information retrieval were making the explicit claim to be working with information not documentation.

In Text Question
In 1996, van Rijsbergen and Lalmas, declared that the situation had changed and that the purpose of an information retrieval system was to provide information about a request. **True/False**

In Text Answer
True
From an information science point of view, research on IR systems offers only a theoretical cul-desac. It leads nowhere. The anomaly I have noted is this: the information-handling processes of the computers used for IR systems, their storage capacities, their input and internal information transmissions are measured in terms of *Shannon* theory measures in bits, megabits per second, and so forth.

On the other hand, in the theories of information retrieval effectiveness information is measured in what I call physical measures that is, the documents (or document surrogates) are counted as relevant or non-relevant and simple ratios of these numbers are used.

The subsequent probabilistic calculations are made as though the documents were physical things (as, of course, they are in part), yet the whole enterprise is called information retrieval theory. So why, I ask, are logarithmic measures of information used in the theory of the machine and linear or physical measures of information in IR theory?

If information retrieval theory were called document retrieval theory, the anomaly would disappear. Document retrieval theory would fall into place as a component of *library* science, which is similarly concerned with documents. But that is too simple an idea.

Those who work on IR theory explicitly claim to be working on information, not documentation. I therefore abandon the simple explanation of a misuse of terminology.

I have to assume that IR theorists mean what they say that they are contributing to information science. But are they?' (emphasis in original).Ellis and Brookes should not refer to the opinion of researchers in their attempts to solve this problem. Only arguments count. In our view, it is not too simple an idea to claim that information retrieval theory is in reality document retrieval theory and thus closely associated with library science.

It is not difficult to disprove Brookes's statement that information retrieval does not deal with documents. A short examination of the literature demonstrates this, and even if the Cranfield experiments spoke about "information retrieval," their modern counterpart, the TREC experiments, speak about "text retrieval." "Text retrieval" and "document retrieval" are often used as synonyms for IR.

If one read Brookes's statement in the light of the relationship between the early documentalists and information scientists, it becomes clear that information scientists wanted to forge a distinctive identity to be both more information technology-oriented and more subjected-knowledge oriented.

One reason for information scientists to prefer not to be linked to library science might be that important technological improvements were carried out not by people associated with librarianship, but by those affiliated with computer science. This preference is most probably the reason they claimed to work with "information, not documentation."

Nevertheless Brookes's statement is flawed, and it has provoked endless speculation about the nature of information, which has not contributed to an understanding of the problems of IR. (Compare the quotation by Schrader, 1983, p. 99, cited earlier).

The worst thing may be that information scientists have overlooked some of the most important theoretical problems in their field. Van Rijsbergen (1986, p. 194) has pointed out that the concept of meaning has been overlooked in IS.

The fundamental basis of all previous work including his own is in his opinion wrong because it has been based on the assumption that a formal notion of meaning is not required to solve IR problems.

For us it is reasonable to suggest a link between the neglect of the concepts of text and documents on one hand and meaning (or semantics) on the other. Semantics, meaning,

text, and documents are much more related to theories about language and literature, whereas information is much more related to theories about computation and control.
You do not claim, however, that the statistical methods used in IR have not been efficient. We do claim, however, that semantics and pragmatics, among other things, are essential to better theoretical development in IR, and in the long run also to the improvement of operational systems.

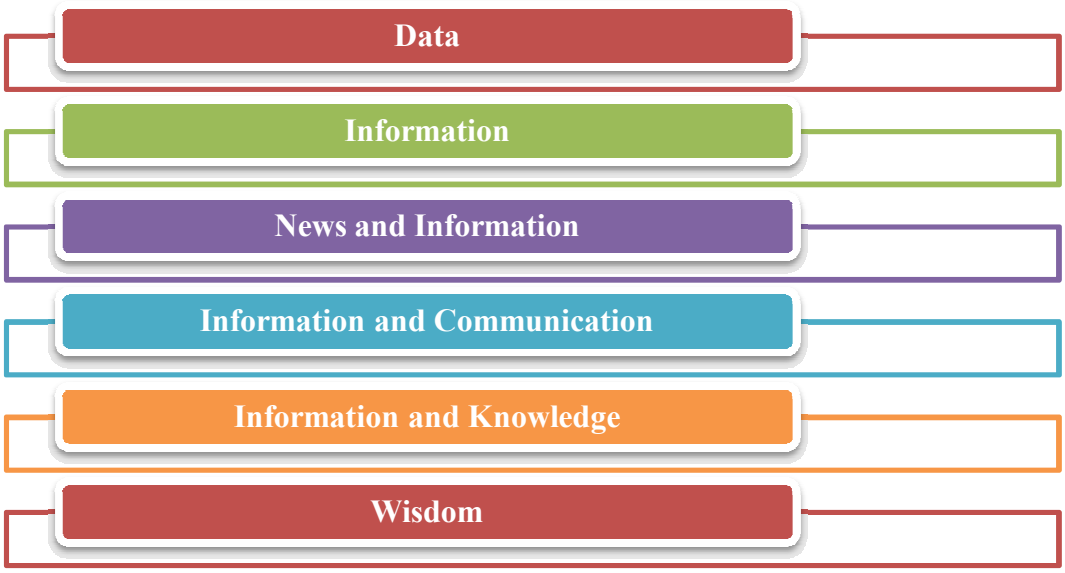

Figure 1.2: *Information terms*

(1) Data

Data can be defined as a symbol or a set of symbols to which meaning can be attached or which can be processed. Data can be in the form of numbers, text, image/graphics, and sound/voice.
When data is arranged in a meaningful form that it can convey some idea, it becomes information. Obviously, processed data becomes information. Processing of data could be translation, calculation, arrangement, etc. Information is the output of a data processing system.

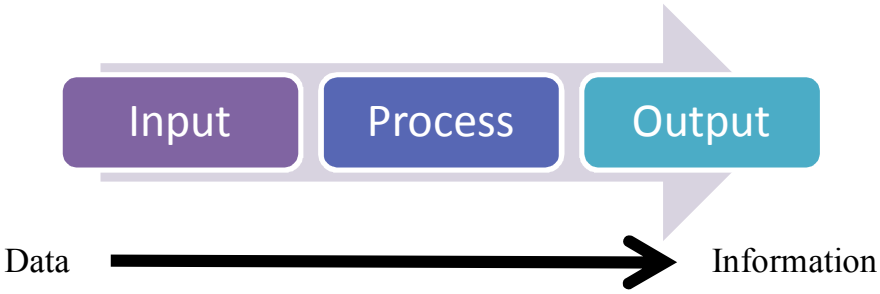

Figure 1.3: *Information Process*

However, information is not an end in itself but a means to an end. If information, which

is the output of computer processing, is re – input into the same or another computer, it becomes data again, which can be processed further.

(2) Information

There is no single universal definition for information. This led to the definitional problem of information. The problem is further compounded by the fact that information is a category word, e.g. agricultural information, financial information, scientific and technical information, etc. Information scientists/researchers have therefore resolved to conceptualize information (i.e. information is regarded as a concept).

Therefore, information can be conceptualized from several points of view. Thus, from the data point of view we can define information as data to which meaning has been attached or data that has been processed or evaluated. From the point of view of uncertainty, we can define information as that phenomenon that enhances our understanding of a subject matter or helps to a certain extent to resolve an uncertainty about the subject matter. 7

(3) News and Information

News is anything new or any piece of information that is new. It is the newness that distinguishes it from information. Information could either be news or not. The following axiom could be proved: All news is information but not all information is news. This means that news is a subset of information.

(4) Information and Communication

Communication is a means of disseminating information. Communication is a process; information is being transmitted in the process. So, communication is a process of conserving or transmitting information from the source or origin through a channel/medium to the recipient or destination.

The source/origin could be documentary material, e.g. published/unpublished literature or working papers. It can even be people. The channel is the pathway through which information travels, e.g. telephone line or Internet

(5) Information and Knowledge

When one obtains information, understands and assimilates it and is even able to pass it on, it becomes knowledge, i.e., there must be a clear perception. It is possible to have information and even pass it on without understanding it but there must be understanding and assimilation before we can call it knowledge.

Personal knowledge, once incorporated into replicable media, including books, journals, software, etc. serves as potential information to others. In general, knowledge seems to represent a higher degree of certainty or validity than information. Information is a set of facts, while knowledge connotes understanding with the implication that not all information is necessarily understood.

(6) Wisdom

Wisdom is the application of knowledge in human judgment. It is a higher level of knowledge or ‘meta-knowledge’. Wisdom is essentially knowledge about manipulating knowledge.

1.2 Relationship between Data and Information

"The numbers have no way of speaking for themselves. You speak for them. You imbue them with meaning." Statistician Nate Silver in the book The Signal and the Noise. Data are simply facts or figures bits of information, but not information itself. When data are processed, interpreted, organized, structured or presented so as to make them meaningful or useful, they are called information. Information provides context for data.

For example, a list of dates data is meaningless without the information that makes the dates relevant (dates of holiday). "Data" and "information" are intricately tied together, whether one is recognizing them as two separate words or using them interchangeably, as is common today. Whether they are used interchangeably depends somewhat on the usage of "data" — its context and grammar.

In Text Question

"Data" and "information" are intricately tied differently. **True/False**

In Text Answer
False

1.2.1 Examples of Data and Information

The history of temperature readings all over the world for the past 100 years is data. If this data is organized and analyzed to find that global temperature is rising, then that is information.

The number of visitors to a website by country is an example of data. Finding out that traffic from the U.S. is increasing while that from Australia is decreasing is meaningful information. Often data is required to back up a claim or conclusion (information) derived or deduced from it.

For example, before a drug is approved by the FDA, the manufacturer must conduct clinical trials and present a lot of data to demonstrate that the drug is safe.

Summary from Study Session 1

In this study session, you have learnt the following:

Definition of Information

Information are data that is accurate and timely, specific and organized for a purpose, presented within a context that gives it meaning and relevance, and can lead to an increase in understanding and decrease in uncertainty.

Relationship between Data and Information

Data are simply facts or figures bits of information, but not information itself. When data are processed, interpreted, organized, structured or presented so as to make them meaningful or useful, they are called information. Information provides context for data.

Self-Assessment Questions (SAQs) for study session 1

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 1.1 (Testing Learning Outcomes 1.1)

Explain the following:

1. Data
2. Information
3. News and Information
4. Information and Communication
5. Information and Knowledge

SAQ 1.2 (Testing Learning Outcomes 1.2)

Explain the relationship between data and information

References

Bates, M.J. 1999. The Invisible Substrate of Information Science. Journal of the American Society of Information Science, 50 (12), 1043-1050

Summers, R; Oppenheim, C; Meadows, A.J; Mcknight, C,and Evans, D.M.1999. Information Science in 2010: A Loughborough University view. Journal of the American Society of Information Science., 50 (12), 1153-1162

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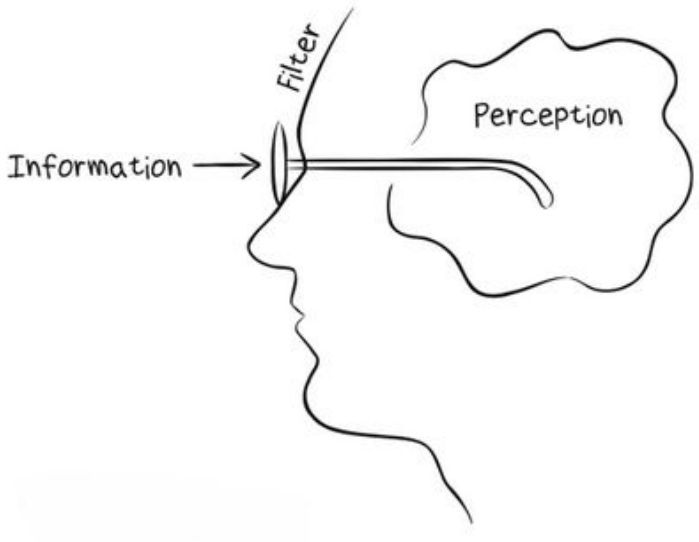
Study Session 2: Characteristics and Perception of Information

Expected duration: 1 week or 2 contact hours



Source:*http://3.bp.blogspot.com/-uJjsdvZ1veg/UjszmaKP0UI/AAAAAAAAAEAc/dVVGA76HUnk/s1600/information-filter-perception.png*

Introduction

Fundamentally, Information has some peculiar features or characteristics that had been in existence since the creation of mankind. These characteristics could only be shaped but not altered by the advent of modern day technologies.

All the same, while information is strictly ubiquitous and elusive, the way people perceive information greatly differs, ranging from being tangible, intangible or even regarded as a process.

Learning Outcomes for Study Session 2

At the end of this study session, you should be able to:

2.1 Highlight on the Characteristics of Information

2.2 Explain the Perception of Information

2.3 Discuss on the Ubiquity and Elusiveness of Information

2.1 Characteristics of Information

Good information is that which is used and which creates value. Experience and research shows that good information has numerous qualities.

Good information is relevant for its purpose, sufficiently accurate for its purpose, complete enough for the problem, reliable and targeted to the right person. It is also communicated in time for its purpose, contains the right level of detail and is communicated by an appropriate channel, i.e. one that is understandable to the user.

Further details of these characteristics related to organizational information for decision-making in the followings:

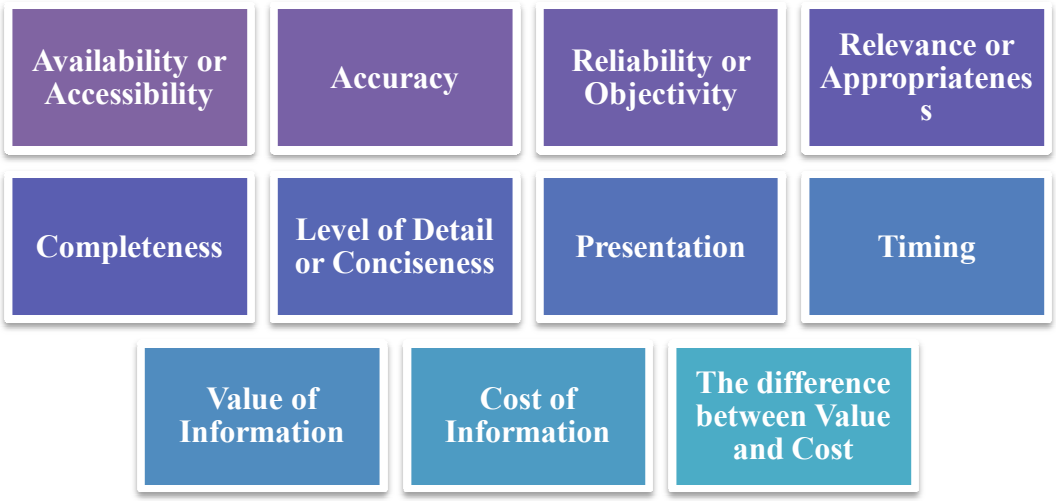


Figure 2.1: *Characteristics of Information*

1. Availability or accessibility

Information should be easy to obtain or access. Information kept in a book of some kind is only available and easy to access if you have the book to hand. A good example of availability is a telephone directory, as every home has one for its local area.

It is probably the first place you look for a local number. But nobody keeps the whole country's telephone books so for numbers further afield you probably phone a directory enquiry number. For business premises, say for a hotel in London, you would probably use the Internet.

Businesses used to keep customer details on a card-index system at the customer's branch. If the customer visited a different branch a telephone call would be needed to check details. Now, with centralized computer systems, businesses like banks and building societies can access any customer's data from any branch.

2. Accuracy

Information needs to be accurate enough for the use to which it is going to be put. To obtain information that is 100% accurate is usually unrealistic as it is likely to be too expensive to produce on time. The degree of accuracy depends upon the circumstances. At operational levels information may need to be accurate to the nearest penny – on a supermarket till receipt, for example.

At tactical level department heads may see weekly summaries correct to the nearest £100, whereas at strategic level directors may look at comparing stores' performances over several months to the nearest £100,000 per month.

Accuracy is important. As an example, if government statistics based on the last census wrongly show an increase in births within an area, plans may be made to build schools and construction companies may invest in new housing developments. In these cases any investment may not be recouped.

3. Reliability or objectivity

Reliability deals with the truth of information or the objectivity with which it is presented. You can only really use information confidently if you are sure of its reliability and objectivity.

When researching for an essay in any subject, we might make straight for the library to find a suitable book. We are reasonably confident that the information found in a book, especially one that the library has purchased, is reliable and (in the case of factual information) objective. The book has been written and the author's name is usually printed for all to see.

The publisher should have employed an editor and an expert in the field to edit the book and question any factual doubts they may have. In short, much time and energy goes into publishing a book and for that reason we can be reasonably confident that the information is reliable and objective.

Compare that to finding information on the Internet where anybody can write unedited and unverified material and 'publish' it on the web.

Unless you know who the author is, or a reputable university or government agency backs up the research, then you cannot be sure that the information is reliable. Some Internet websites are like vanity publishing, where anyone can write a book and pay certain (vanity) publishers to publish it.

4. Relevance or appropriateness

Information should be relevant to the purpose for which it is required. It must be suitable. What is relevant for one manager may not be relevant for another. The user will become frustrated if information contains data irrelevant to the task in hand.

For example, a market research company may give information on users' perceptions of the quality of a product. This is not relevant for the manager who wants to know opinions on relative prices of the product and its rivals. The information gained would not be relevant to the purpose.

5. Completeness

Information should contain all the details required by the user. Otherwise, it may not be useful as the basis for making a decision. For example, if an organization is supplied with information regarding the costs of supplying a fleet of cars for the sales force, and servicing and maintenance costs are not included, then a costing based on the information supplied will be considerably underestimated.

Ideally all the information needed for a particular decision should be available. However, this rarely happens; good information is often incomplete. To meet all the needs of the situation, you often have to collect it from a variety of sources.

6. Level of detail or conciseness

Information should be in a form that is short enough to allow for its examination and use. There should be no extraneous information. For example, it is very common practice to summarize financial data and present this information, both in the form of figures and by using a chart or graph.

We would say that the graph is more concise than the tables of figures as there is little or no extraneous information in the graph or chart. Clearly there is a trade-off between level of detail and conciseness.

7. Presentation

The presentation of information is important to the user. Information can be more easily assimilated if it is aesthetically pleasing. For example, a marketing report that includes graphs of statistics will be more concise as well as more aesthetically pleasing to the users within the organization.

Many organizations use presentation software and show summary information via a data projector. These presentations have usually been well thought out to be visually attractive and to convey the correct amount of detail.

8. Timing

Information must be on time for the purpose for which it is required. Information received too late will be irrelevant. For example, if you receive a brochure from a theatre and notice there was a concert by your favourite band yesterday, then the information is too late to be of use.

9. Value of information

The relative importance of information for decision-making can increase or decrease its value to an organization. For example, an organization requires information on a competitor's performance that is critical to their own decision on whether to invest in new machinery for their factory.

The value of this information would be high. Always keep in mind that information should be available on time, within cost constraints and be legally obtained.

10. Cost of information

Information should be available within set cost levels that may vary dependent on situation. If costs are too high to obtain information an organization may decide to seek slightly less comprehensive information elsewhere.

For example, an organization wants to commission a market survey on a new product. The survey could cost more than the forecast initial profit from the product. In that situation, the organization would probably decide that a less costly source of information should be used, even if it may give inferior information.

11. The difference between value and cost

Many students in the past few years have confused the definitions of value and cost. Information gained or used by an organization may have a great deal of value even if it may not have cost a lot. An example would be bookshops, who have used technology for many years now, with microfiche giving way to computers in the mid to late 1990s.

Microfiche was quite expensive and what the bookshops received was essentially a list of books in print. By searching their microfiche by publisher they could tell you if a particular book was in print.

Eventually this information became available on CD-ROM. Obviously this information has value to the bookshops in that they can tell you whether or not you can get the book. The cost of subscribing to microfiche was fairly high; subscribing to the CD-ROM version only slightly less so.

Much more valuable is a stock system which can tell you instantly whether or not the book is in stock, linked to an on-line system which can tell you if the book exists, where it is available from, the cost and delivery time. This information has far more value than the other two systems, but probably actually costs quite a bit less. It is always up-to-date and stock levels are accurate.

You are so used to this system that we cannot envisage what frustrations and inconvenience the older systems gave. The new system is certainly value for money.

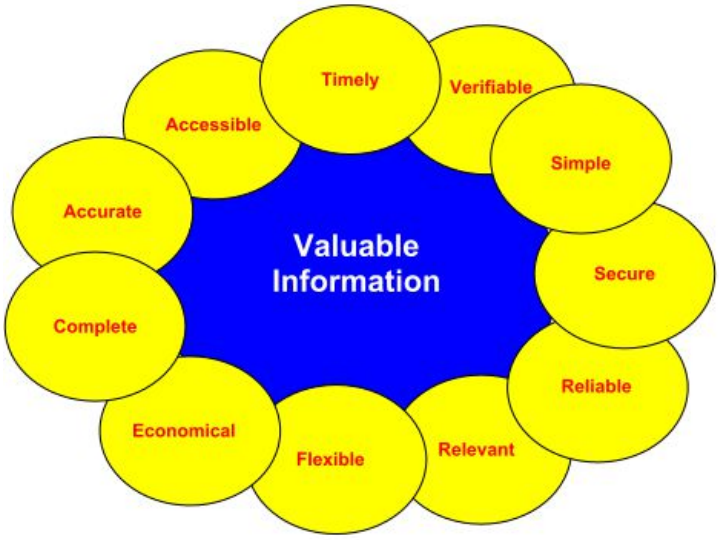


Figure 2.1: *Characteristics of Information*
Source: *https://bitnotes4u.files.wordpress.com/2013/01/final1.png*

2.2 Perception of Information

There are three different views by which people perceive information, they are as follows:

1. Perception of Information as a Commodity

That information, knowledge and wisdom have financial value has been acknowledged for many years. If I may quote from the Christian Holy Bible:

"Happy is the man that findeth wisdom and the man that getteth understanding For the merchandise of it is better than the merchandise of silver and the gain thereof than fine gold"

This is extracted from the "Book of Proverbs", whose compilation started eight hundred years before the present era. In spite of this, the idea that information (as opposed to the information carriers such as manuscripts and books) is something that should be paid for is not something that has been apparent to the general public, except in the cases of military and industrial espionage.

One of the first thinkers to posit the coming of the "Information Age" was the economist Fritz Machlup and his predictions generally included the proposition that information was an important commodity which would form the basis of a new economic force.

For quite some time, there have been attempts to identify the information component of products and to cost out the value of these. Peter Drucker, the management guru, for instance has pointed out that in new industries information, as opposed to parts and labour, is increasingly forming inputs to products.

The cost of an automobile, for example, is 40% material and 25% labour, whilst for a silicon chip the cost is 1% materials 10% labour and 70% information. Even in the case of an automobile, the proportion of information that is input to its manufacture is rising rapidly.
In the UK in the 1980's there was a heightened awareness of the commercial value of information with the publication of a report entitled "Making a Business of Information" which had been produced by an advisory group to the Government's Cabinet Office called the Information Technology Advisory Panel (ITAP for short).
The recommendations of this report were warmly welcomed by the Government since it provided further sources of profit, capitalized on a resource which the British were good at exploiting and provided a further example of public resources (i.e. government information) that could be exploited by the private sector.
Mrs. Thatcher herself is alleged to have said that she was greatly in favour of the "free flow of information but not the flow of free information".

In Text Question
In spite of this, the idea that information is something that should be paid for is not something that has been apparent to the general public, except in the cases of military and industrial espionage. **True/False**
In Text Answer
True
(a) **Information**
Since there are two concepts implicit in the title of my talk, I would like to define what I intend to cover. First, information - theoretically, any signal that can be transmitted and received is information and, as far as human beings are concerned, anything that can stimulate any of the senses is information.
Information can be transmitted for the purposes of culture, leisure, work, research and everyday life. I shall mainly consider the use of formalized textual information, produced and transmitted for a definite purpose. Within this paper, any of the following categories can be included in the concept of information:
Listings - a list identifying various carriers of information (i.e. books, journals, journal studies, videos, films, records), without much digestion of the information contained in them and with little or no classification.
(b) **Bibliographic references**
These are detailed descriptions of the information carriers. The descriptions are standardized and allow for easy identification of the carriers in question. There may or may not be keywords or classification to indicate the content of the material. References organized for information retrieval.
This category covers the indexing and abstracting services and contains sufficient information to select the carriers required. Abstracts, especially, frequently have sufficient information to be used as surrogates for the information carrier itself.

The information carrier or a copy thereof- i.e. the actual book, journal article, film, manuscript, database entry etc. Information extracted from the carrier or carriers and presented without comment. Intelligence - information processed and digested and presented in an analyzed form to meet specific needs.
Advice - information that is interpreted and presented, together with appropriate experience, to meet a specific application.

(c) **Commodity?**

The "New Oxford Dictionary of English" defines commodity as:
"a raw material or primary agricultural product that can be bought or sold, such as copper or coffee a useful or valuable thing such as water or time". "an article or raw material that can be bought or sold, especially a product as opposed to a service. a useful thing".
"an article of trade; (in plural) goods, produce; profit, expediency, advantage, convenience or privilege (archaic)"I doubt that any of us here would argue against the idea that information is a "useful thing". For the purposes of this paper, I intend to define a commodity as "an item that can be bought or sold".
Under this definition, then the answer to the question posed in the title must be "yes - information is a commodity" although I propose not to search, at least in this paper, for a definition of an "item" of information. Information is perceived as a commodity that could be bought, sold and transferred over space. An example of such information is information contained in books, newspapers, journals, CD – ROMs, etc.

2. Perception of Information as a Process

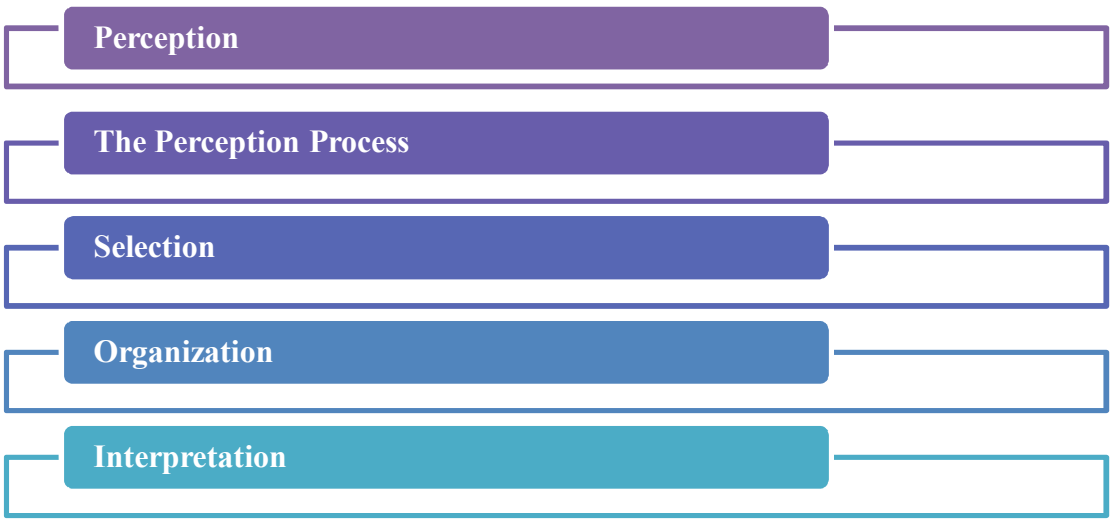


Figure 2.2: *Information as a Process*

A informs B, i.e. A is communicating with B. Here, information is likened to communication

(a) Perception

Perception refers to the set of processes we use to make sense of all the stimuli you encounter every second, from the glow of the computer screen in front of you to the smell of the room to the itch on your ankle.

Our perceptions are based on how we interpret all these different sensations, which are sensory impressions we get from the stimuli in the world around us. Perception enables us to navigate the world and to make decisions about everything, from which T-shirt to wear or how fast to run away from a bear.

Close your eyes. What do you remember about the room you are in? The color of the walls, the angle of the shadows? Whether or not we know it, we selectively attend to different things in our environment. Our brains simply don't have the capacity to attend to every single detail in the world around us.

Optical illusions highlight this tendency. Have you ever looked at an optical illusion and seen one thing, while a friend sees something completely different? Our brains engage in a three-step process when presented with stimuli: selection, organization, and interpretation.

For example, think of Rubin's Vase, a well-known optical illusion depicted below. First we select the item to attend to and block out most of everything else. It's our brain's way of focusing on the task at hand to give it our attention.

In this case, we have chosen to attend to the image. Then, we organize the elements in our brain. Some individuals organize the dark parts of the image as the foreground and the light parts as the background, while others have the opposite interpretation.

Some individuals see a vase because they attend to the black part of the image, while some individuals see two faces because they attend to the white parts of the image. Most people can see both, but only one at a time, depending on the processes described above. All stages of the perception process often happen unconsciously and in less than a second.

(b) The Perception Process

The perceptual process is a sequence of steps that begins with stimuli in the environment and ends with our interpretation of those stimuli. This process is typically unconscious and happens hundreds of thousands of times a day.

An unconscious process is simply one that happens without awareness or intention. When you open your eyes, you do not need to tell your brain to interpret the light falling onto your retinas from the object in front of you as "computer" because this has happened unconsciously. When you step out into a chilly night, your brain does not need to be told "cold" because the stimuli trigger the processes and categories automatically.

(c) Selection

The world around us is filled with an infinite number of stimuli that we might attend to, but our brains do not have the resources to pay attention to everything. Thus, the first step

of perception is the (usually unconscious, but sometimes intentional) decision of what to attend to.
Depending on the environment, and depending on us as individuals, we might focus on a familiar stimulus or something new. When we attend to one specific thing in our environment whether it is a smell, a feeling, a sound, or something else entirely—it becomes the attended stimulus.

(d) Organization

Once we have chosen to attend to a stimulus in the environment (consciously or unconsciously, though usually the latter), the choice sets off a series of reactions in our brain. This neural process starts with the activation of our sensory receptors (touch, taste, smell, sight, and hearing).
The receptors transduce the input energy into neural activity, which is transmitted to our brains, where we construct a mental representation of the stimulus (or, in most cases, the multiple related stimuli) called a percept. An ambiguous stimulus may be translated into multiple percepts, experienced randomly, one at a time, in what is called "multistable perception."

(e) Interpretation

After you have attended to a stimulus, and our brains have received and organized the information, you interpret it in a way that makes sense using our existing information about the world. Interpretation simply means that we take the information that we have sensed and organized and turn it into something that we can categorize.
For instance, in the Rubin's Vase illusion mentioned earlier, some individuals will interpret the sensory information as "vase," while some will interpret it as "faces." This happens unconsciously thousands of times a day. By putting different stimuli into categories, we can better understand and react to the world around us.

In Text Question

Rubin's Vase illusion mentioned earlier, some individuals will interpret the sensory information as "vase," while some will interpret it as
(a) "Faces."
(b) “Stimuli”
(c) Emotion
(d) “Action”

In Text Answer

The answer is (a) “faces”

3. Perception of Information as an Unobservable Mental State

Here, information is not something we can see. It is present in the sub-conscious minds of people.

2.3 The Ubiquity and Elusiveness of Information

Information is both ubiquitous and elusive! The ubiquity of information arises from the observation that all objects are innately information bearing. The physical presence of a knife, for instance, bears information about whether it is a kitchen or hunting knife. The same is true of any other object.

In addition, the innate information-conveying characteristics of objects are further enhanced in some objects called information products and technologies, which are purposely created by people to store, convey or transfer information.

Among them are documents generally (books, journals, newspapers, maps, drawings and paintings, sound and video recordings, databases, etc.); museum artifacts, and information and communication systems. In addition, people are themselves important store-houses, conveyors and purveyors of information.

The ubiquity of information appears to be equally matched by its ever-shifting reality. The information borne by an object or information product is highly person-and context-dependent. Lying on a kitchen table, a knife would convey a specific meaning to its beholder (i.e. conveys information on its use, at a glance or at the first impression).

However, were the same knife to be placed on the exhibit table of a law court, the information it conveys would probably be completely different (here the information on its use as a kitchen knife appears elusive) - may be a murder weapon or a recovered stolen item. Indeed, the information exuded by the knife would probably be different for the judge, the prosecutor, the defendant, and the audience.

Summary from Study Session 1

In this study session, you have learnt the following:

(1) **Characteristics of Information:**

a) Availability or Accessibility
b) Accuracy
c) Reliability or Objectivity
d) Relevance or Appropriateness
e) Completeness
f) Level of Detail or Conciseness
g) Presentation
h) Timing
i) Value of Information
j) Cost of Information
k) The difference between Value and Cost

(1) Perception of Information

(a) Perception of Information as a Commodity

That information, knowledge and wisdom have financial value has been acknowledged for many years. If I may quote from the Christian Holy Bible:

"Happy is the man that findeth wisdom and the man that getteth understanding for the merchandise of it is better than the merchandise of silver and the gain thereof than fine gold"

(b) Perception of Information as a Process

- Perception
- The Perception Process
- Selection
- Organization
- Interpretation

(c) Perception of Information as an Unobservable Mental State

Here, information is not something we can see. It is present in the sub-conscious minds of people.

(2) The Ubiquity and Elusiveness of Information

Information is both ubiquitous and elusive! The ubiquity of information arises from the observation that all objects are innately information bearing. The physical presence of a knife, for instance, bears information about whether it is a kitchen or hunting knife. The same is true of any other object.

Self-Assessment Questions (SAQs) for study session 2

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 2.1 (Testing Learning Outcomes 2.1)

List out the Characteristics of Information

SAQ 2.2 (Testing Learning Outcomes 2.2)

Explain the following:

- ❖ Perception of Information as a Commodity
- ❖ Perception of Information as a Process
- ❖ Perception of Information as an Unobservable Mental State

SAQ 2.3 (Testing Learning Outcomes 2.3)

Discuss on the Ubiquity and Elusiveness of Information

References

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Saracevic, T (2009). Information Science. Journal of the American Society for Information Science, 50 (12).

Study Session 3: Classification of Information

Expected duration: 1 week or 2 contact hours

Source:http://advisera.com/wp-content/uploads//sites/5/2015/06/Information_Classification1.jpg

Introduction

There are several types of information depending on the criteria under consideration. It is interesting that people often classify information according to their information needs. Thus, the classification can never be exhaustive since human information needs are so much diverse and numerous in nature.

In this study session, the classification pertains to only the documented types of information. An example of non documented type of information is information that is conveyed through unrecorded verbal communication from one person to another.

Learning Outcomes for Study Session 3

At the end of this study session, you should be able to:

3.1 Highlight on Classification of Information

3.2 Explain Classification Based on Whether Information is hard or soft

3.3 Discuss Classification based on Level of Usage

3.1 Classification of Information

There are various ways by which information can be classified. In view of the documented types, you can classify information as follows:

3.1.1 Classification in Terms of Form

Form classification is the classification of organisms based on their morphology, which does not necessarily reflect their biological relationships. Form classification, generally restricted to palaeontology, reflects uncertainty; the goal of science is to move "form taxa" to biological taxa whose affinity is known.

Strictly defined, form taxonomy is restricted to fossils that preserve too few characters for a conclusive taxonomic definition or assessment of their biological affinity, but whose study is made easier if a binomial name is available by which to identify them.
The term "form classification" is preferred to "form taxonomy"; taxonomy suggests that the classification implies a biological affinity, whereas form classification is about giving a name to a gruup of morphologically-similar organisms that may not be related.

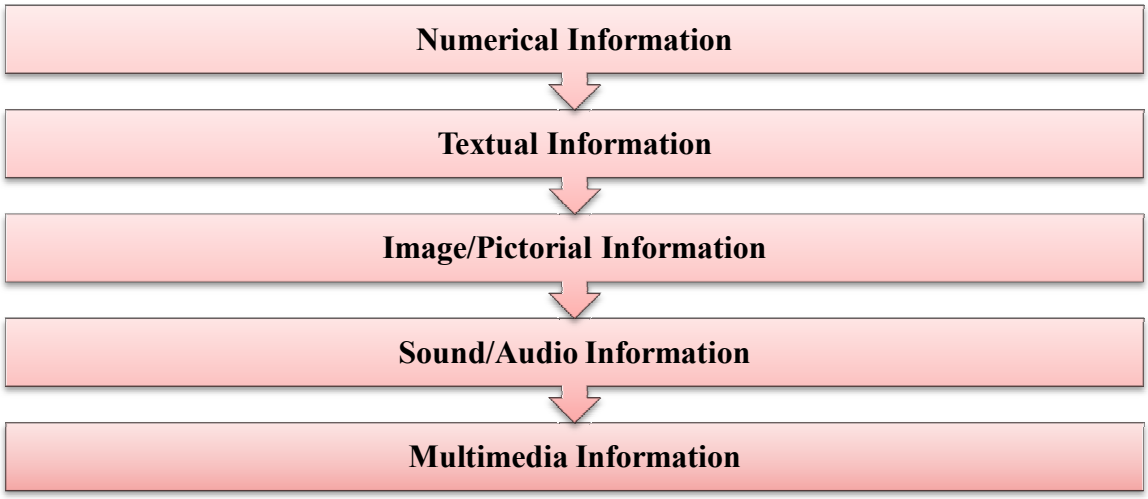

Figure 3.1: *Classification in Terms of Form*

(a) Numerical Information

Numerical data is information that is something that is measurable. It is always collected in number form, although there are other types of data that can appear in number form. An example of numerical data would be the number of people that attended the movie theater over the course of a month.
One of the ways you can identify numerical data is by seeing if the data can be added together. In fact, you should be able to perform just about any mathematical operation on numerical data.
You can also put data in ascending (least to greatest) and descending (greatest to least) order. Data can only be numerical if the answers can be represented in fraction and/or

decimal form. If you have to group the information into categories, then it is considered categorical.

If you were to measure the height of four ladders, you could average the heights, you could add the heights, and you could put them in ascending or descending order. That's because the height of the ladders is numerical data!

(b) Textual Information

Informational text is nonfiction writing, written with the intention of informing the reader about a specific topic. It is typically found in magazines, science or history books, autobiographies and instruction manuals.

They are written in a way that allows the reader to easily find key information and understand the main topic. The author will do this by providing headers over certain sections, by placing important vocabulary in bold type, and by using visual representations with captions.

This visual representation can be a pictures or even infographics that include tables, diagrams,grahps and charts. In some cases the author will even provide the reader with a table of content or glossary to assist them in finding the information easily. This is in the form of letters and alphabets. Examples include newspaper based information and text messages.

(c) Image/Pictorial Information

This is in form of symbols, maps, charts, photographs, pictures, paintings, road signals, and all other kinds of diagrams. Image is an artifact that depicts visual perception, for example a two-dimensional picture, that has a similar appearance to some subject usually a physical object or a person, thus providing a depiction of it.

(d) Sound/Audio Information

This includes any piece of information perceived through the ear, e.g. any piece of music or information transmitted through voice messages.

Multimedia is content that uses a combination of different content forms such as text, audio, images, animation, video and interactive content. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material.

(e) Multimedia Information

Multimedia can be recorded and played, displayed, dynamic, interacted with or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Multimedia devices are electronic media devices used to store and experience multimedia content.

Multimedia is distinguished from mixed media in fine art; by including audio, for example, it has a broader scope. The term "rich media" is synonymous for interactive multimedia. Hypermedia scales up the amount of media content in multimedia

application. Audio is sound within the acoustic range available to humans.
An audio frequency (AF) is an electrical alternating current within the 20 to 20,000 hertz (cycles per second) range that can be used to produce acoustic sound. In computers, audio is the sound system that comes with or can be added to a computer. An audio card contains a special built-in processor and memory for processing audio files and sending them to speakers in the computer.
An audio file is a record of captured sound that can be played back. Sound is a sequence of naturally analog signals that are converted to digital signals by the audio card, using a microchip called an analog-to-digital converter (ADC). When sound is played, the digital signals are sent to the speakers where they are converted back to analog signals that generate varied sound.
Audio files are usually compressed for storage or faster transmission. Audio files can be sent in short stand-alone segments - for example, as files in the Wave file format.
In order for users to receive sound in real-time for a multimedia effect, listening to music, or in order to take part in an audio or video conference, sound must be delivered as streaming sound. More advanced audio cards support wavetable, or recaptured tables of sound. The most popular audio file format today is MP3 (MPEG-1 Audio Layer-3).
Multimedia is content that uses a combination of different content forms such as text, audio, images, animation, video and interactive content. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material.

Multimedia can be recorded and played, displayed, dynamic, interacted with or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance.

Multimedia devices are electronic media devices used to store and experience multimedia content. Multimedia is distinguished from mixed media in fine art; by including audio, for example, it has a broader scope. The term "rich media" is synonymous for interactive multimedia. Hypermedia scales up the amount of media content in multimedia application.

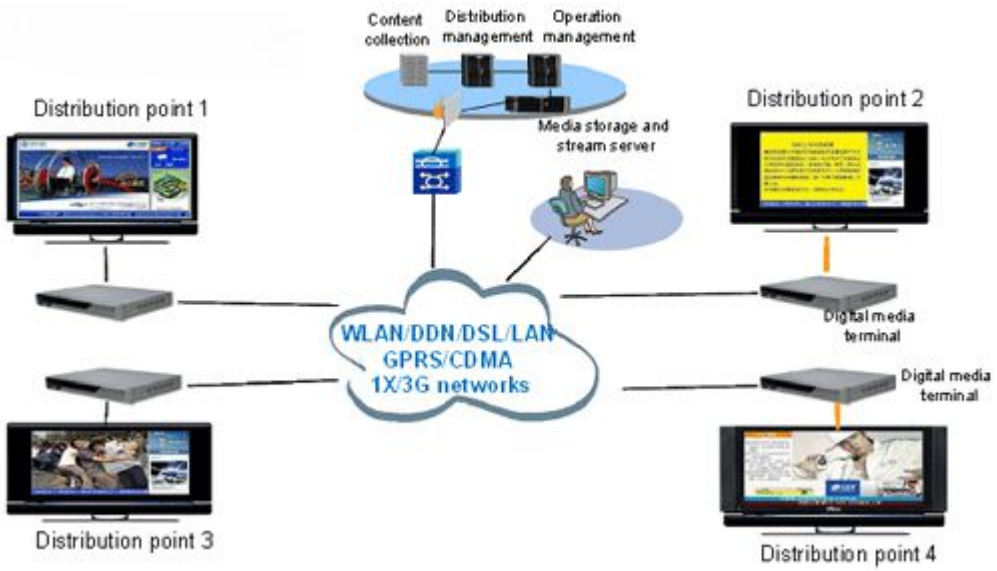

Figure 3.2: *Multimedia Distribution System*
Source:*http://en.datanggroup.cn/upload/fckeditor/digital%20multimedia%20information%20distribution0001.jpg*

Characteristics of multimedia
Multimedia presentations may be viewed by person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation.

Broadcasts and recordings can be either analog or digital electronic media technology. Digital online multimedia may be downloaded or streamed. Streaming multimedia may be live or on-demand. Multimedia games and simulations may be used in a physical environment with special effects, with multiple users in an online network, or locally with an offline computer, game system, or simulator.

The various formats of technological or digital multimedia may be intended to enhance the users' experience, for example to make it easier and faster to convey information. Or in entertainment or art, to transcend everyday experience. A laser show is a live multimedia performance.

Enhanced levels of interactivity are made possible by combining multiple forms of media content. Online multimedia is increasingly becoming object-oriented and data-driven, enabling applications with collaborative end-user innovation and personalization on multiple forms of content over time.

Examples of these range from multiple forms of content on Web sites like photo galleries with both images (pictures) and title (text) user-updated, to simulations whose co-

efficient, events, illustrations, animations or videos are modifiable, allowing the multimedia "experience" to be altered without reprogramming.

In addition to seeing and hearing, Haptic technology enables virtual objects to be felt. Emerging technology involving illusions of taste and smell may also enhance the multimedia experience.

In Text Question
Broadcasts and recordings can be either analog or digital electronic media technology. **True/False**

In Text Answer
True

3.2 Classification based on Level of Usage

Here, you can identify three different types of information.

Figure 3.3: *Types of Information*

a) Strategic Information

This is information needed by top-level management for decision-making. Such decisions tend to require external data. Information needed here is long-range for strategic decisions. Strategic information is captured through Decision Support Systems (DSS) to make strategic planning.

b) Tactical information

Tactical information is needed by middle level managers and is concerned with decisions made at the strategic level. Tactical information may include information on allocating the resources needed to meet organizational objectives, and examples are information on plant layout, personnel concerns, budget allocation, and production scheduling.

c) Operational information

This is information needed for the routine running of the affairs of an enterprise. The

information is primarily sourced from internally generated data, and a high degree of accuracy is needed. Frequent reporting is necessary because of the short range of the decisions involved.

Operational information is needed by lower–level management (e.g. supervisors), and includes information needed to make decisions on whether to accept or reject a credit, and assigning jobs to individual workers. However, it should be noted that the classification of information can never be exhaustive.

Information can also be classified according to roles (e.g. problem-solving information), coverage (e.g. general/public information), availability and accessibility (classified and propriety information).

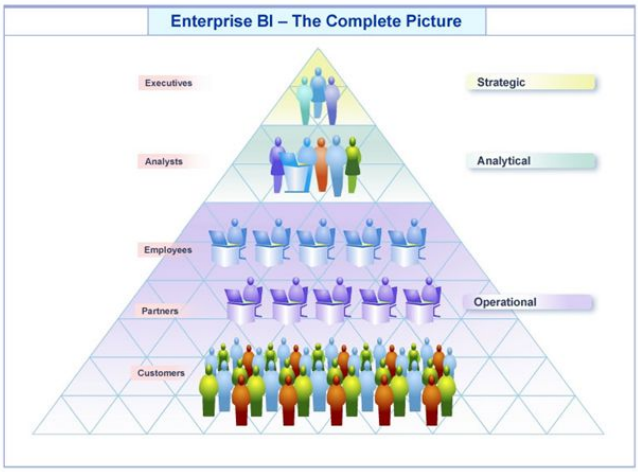

Figure 3.4: Operational information

Source:*http://www.informationbuilders.com/sites/www.informationbuilders.com/files/images/l1/obi-800.jpg*

3.3 Classification Based on Whether Information is hard or soft

Hard information is from research findings, i.e. any piece of information which originates as a result of conduct of research. Such information is disseminated through any of the following channels**:** books, journals, conference proceedings, etc. Soft information, on the other hand, is from the media, and is mostly used for propaganda.

Most government institutions employ soft information in selling their programmes to the people, to create awareness in the society and to enlighten the citizenry about the workings of the government generally. Soft information is often disseminated through both the print (daily newspapers, newsmagazines, etc.) and electronic (Radio and T.V) media.

It should be pointed out however that, hard information can become soft information and vice versa. When soft information becomes published in any of the established media of disseminating hard information, then it becomes hard; so also when hard information

(research findings) is published in newspapers, newsmagazines, etc, for a wider readership, it becomes soft information.

Summary from Study Session 3

In this study session, you have learnt the following:

1. Classification in Terms of Form

Include:

1. what is Numerical Information
2. Textual Information
3. Image/Pictorial Information
4. Sound/Audio Information
5. Multimedia Information

Self-Assessment Questions (SAQs) for study session 3

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 3.1 (Testing Learning Outcomes 3.1)

Explain the following;

- Numerical Information
- Textual Information
- Image/Pictorial Information
- Sound/Audio Information
- Multimedia Information

SAQ 3.2 (Testing Learning Outcomes 3.2)

Highlight on the following:

- Strategic Information
- Tactical Information
- Operation Information

SAQ 3.3 (Testing Learning Outcomes 3.3)

Discuss on Classification Based on Whether Information is hard or soft

References

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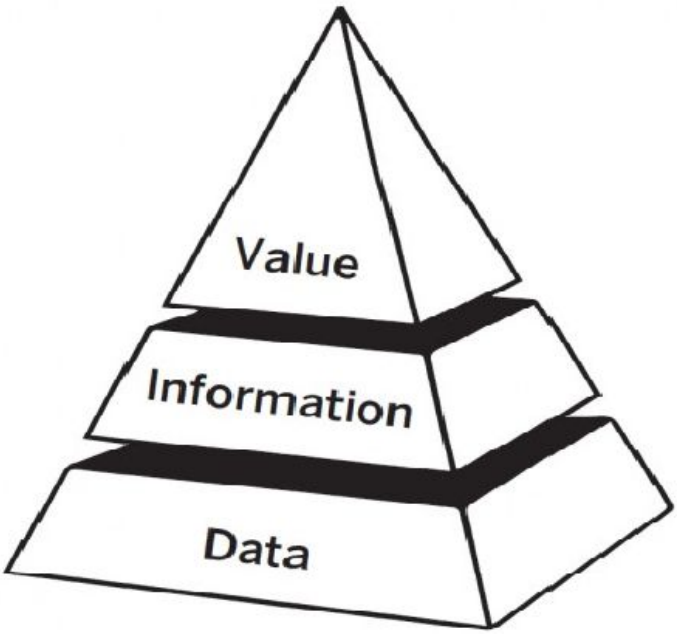
Summers, R; Oppenheim, C; Meadows, A.J; Mcknight, C,and Evans,

D.M.1999. Information Science in 2010: A Loughborough University view. Journal of the American Society of Information Science., 50 (12), 1153-1162

Study Session 4: Uses and Value of Information

Expected duration: 1 week or 2 contact hours



Source: *http://datatovalue.co.uk/WP/wp-content/uploads/2015/01/pyramid-422x455.jpg*

Introduction

People use information for numerous purposes, ranging from problem resolution and decision-making to empowerment and politics. As a result, economists believe that information should not be free and people should pay for information in accordance with its value. So, how can we put value on information?

In particular, how would you quantify information in monetary terms? There are different parameters people have suggested. You shall discuss some of these parameters in this study session.

Learning Outcomes for Study Session 4

At the end of this study session, you should be able to:

4.1 Explain the Uses of Information to Society
4.2 Highlight on Characteristics of Value of Information
4.3 Discuss on the Monetary Value of Information

4.1 Uses of Information to the society

The following are the uses of information to a government, community and corporate organization:

Figure 4.1: *Uses of Information*

(a) Problem Solving

Problem-solving is the ability to identify and solve problems by applying appropriate skills systematically. Problem-solving is a process—an ongoing activity in which we take what we know to discover what we don't know. It involves overcoming obstacles by generating hypo-theses, testing those predictions, and arriving at satisfactory solutions.

(1) Problem-solving involves three basic functions:

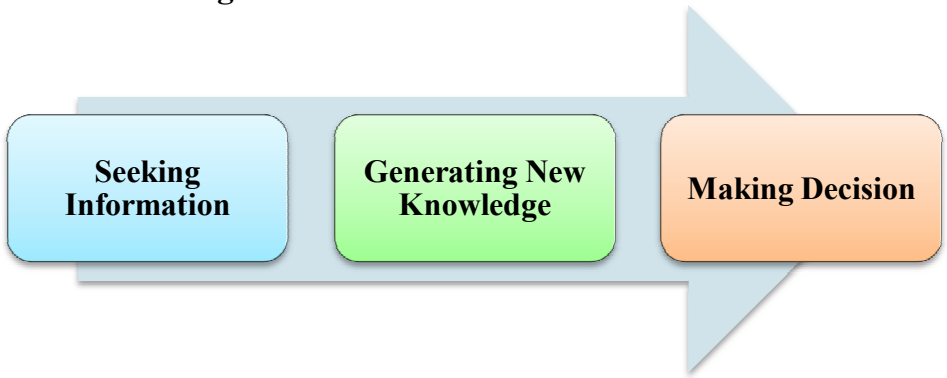


Figure 4.2: *Basic Function*

Problem solving is, and should be, a very real part of the curriculum. It presupposes that students can take on some of the responsibility for their own learning and can take personal action to solve problems, resolve conflicts, discuss alternatives, and focus on thinking as a vital element of the curriculum.

It provides students with opportunities to use their newly acquired knowledge in meaningful, real-life activities and assists them in working at higher levels of thinking.

Here is a **five-stage** model that most students can easily memorize and put into action and which has direct applications to many areas of the curriculum as well as everyday life:

(2) Expert Techniques in Solving Problems

Here are some techniques that will help students understand the nature of a problem and the conditions that surround it:

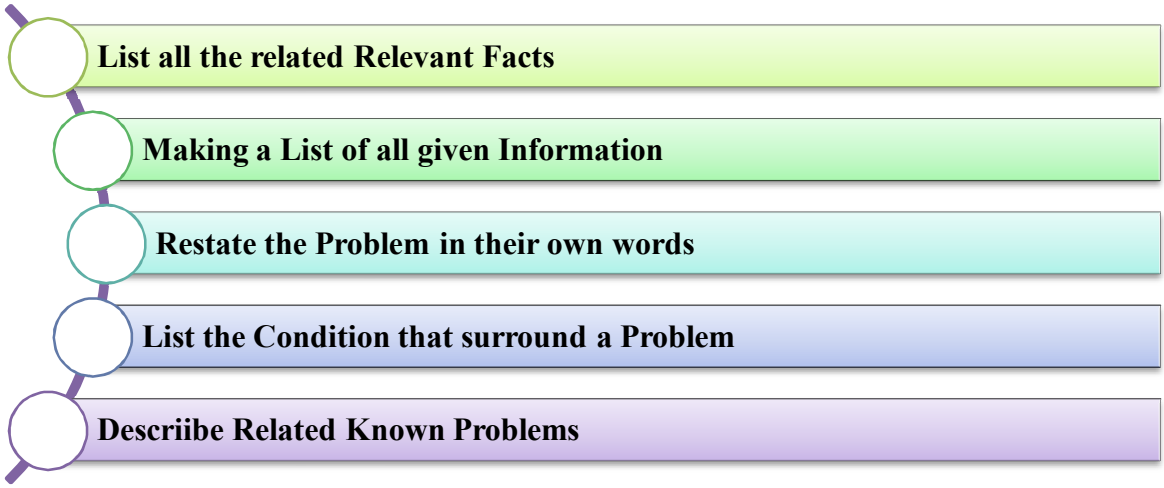


Figure 4.3: *Techniques in Solving Problems*

(3) It's Elementary

For younger students, illustrations are helpful in organizing data, manipulating information, and outlining the limits of a problem and its possible solution(s). Students can use drawings to help them look at a problem from many different perspectives. Understand the problem. It's important that students understand the nature of a problem and its related goals. Encourage students to frame a problem in their own words.

Describe any barriers. Students need to be aware of any barriers or constraints that may be preventing them from achieving their goal. In short, what is creating the problem? Encouraging students to verbalize these impediments is always an important step.

Identify various solutions. After the nature and parameters of a problem are understood, students will need to select one or more appropriate strategies to help resolve the problem. Students need to understand that they have many strategies available to them and that no single strategy will work for all problems.

4.1.1 Problem-solving possibilities

The following are the possible problem solving methods

a. **Create visual images.** Many problem-solvers find it useful to create “mind pictures” of a problem and its potential solutions prior to working on the problem. Mental imaging allows the problem-solvers to map out many dimensions of a problem and “see” it clearly.

b. **Guesstimate.** Give students opportunities to engage in some trial-and-error approaches to problem-solving. It should be understood, however, that this is not a singular approach to problem-solving but rather an attempt to gather some preliminary data.
c. **Create a table.** A table is an orderly arrangement of data. When students have opportunities to design and create tables of information, they begin to understand that they can group and organize most data relative to a problem.
d. **Use manipulatives.** By moving objects around on a table or desk, students can develop patterns and organize elements of a problem into recognizable and visually satisfying components.
e. **Work backward.** It's frequently helpful for students to take the data presented at the end of a problem and use a series of computations to arrive at the data presented at the beginning of the problem.
f. **Look for a pattern.** Looking for patterns is an important problem-solving strategy because many problems are similar and fall into predictable patterns. A pattern, by definition, is a regular, systematic repetition and may be numerical, visual, or behavioral.
g. **Create a systematic list.** Recording information in list form is a process used quite frequently to map out a plan of attack for defining and solving problems. Encourage students to record their ideas in lists to determine regularities, patterns, or similarities between problem elements.
h. **Try out a solution.** When working through a strategy or combination of strategies, it will be important for students to keep accurate and up-to-date records of their thoughts, proceedings, and procedures.

   Recording the data collected, the predictions made, and the strategies used is an important part of the problem solving process. Try to work through a selected strategy or combination of strategies until it becomes evident that it's not working, it needs to be modified, or it is yielding inappropriate data.

   As students become more proficient problem-solvers, they should feel comfortable rejecting potential strategies at any time during their quest for solutions.

   Monitor with great care the steps undertaken as part of a solution. Although it might be a natural tendency for students to “rush” through a strategy to arrive at a quick answer, encourage them to carefully assess and monitor their progress.

   Feel comfortable putting a problem aside for a period of time and tackling it at a later time. For example, scientists rarely come up with a solution the first time they approach a problem. Students should also feel comfortable letting a problem rest for a while and returning to it later.

i. **Evaluate the results**. It's vitally important that students have multiple opportunities to assess their own problem-solving skills and the solutions they generate from using those skills.

Frequently, students are overly dependent upon teachers to evaluate their performance in the classroom. The process of self-assessment is not easy, however. It involves risk-taking, self-assurance, and a certain level of independence.

But it can be effectively promoted by asking students question such as "How do you feel about your progress so far?" "Are you satisfied with the results you obtained?" and "Why do you believe this is an appropriate response to the problem? Problem-solving is the ability to identify and solve problems by applying appropriate skills systematically.
Problem-solving is a process an ongoing activity in which we take what we know to discover what we don't know. It involves overcoming obstacles by generating hypo-theses, testing those predictions, and arriving at satisfactory solutions.

(b) Decision Making

Take time to properly define the problem. What is the issue to be covered? What is the problem? What decisions need to be taken? A fish-bone diagram will sometimes help in understanding the complex interlink ages that create a particular 'problem'. For each of the causes or its effects, make a list of information or data that will be required, and clarify how that information will lead to a better decision.

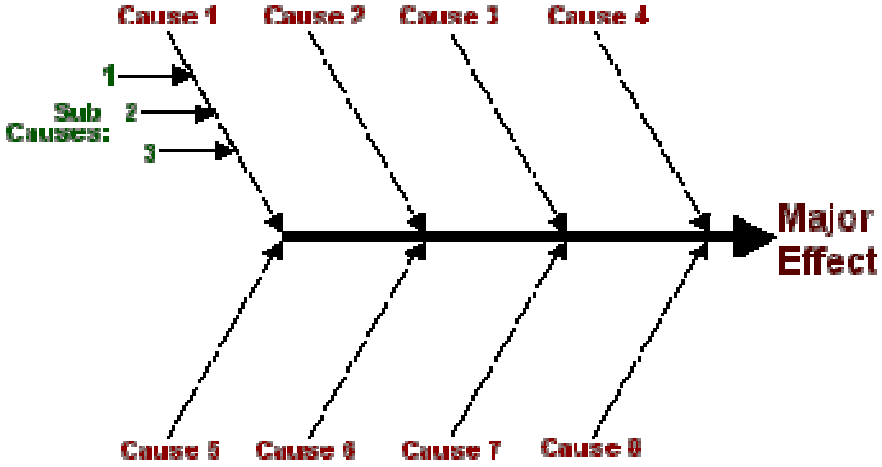


Figure 4.4: *Causes and effect decision making*
Source: *http://www.gdrc.org/decision/info-decision.html*

(1) Finding the information

Determine the sources from where information needed for decision-making can be obtained. What information needs to be taken? Who has that information? Why is that information being collected by the source? Which component of the problem at hand will it help? Evaluate the sources to see which of them can provide the best information, and

identify the mode and format in which the information is presented. Keep in mind that different sources provide information in different formats (for different reasons!).

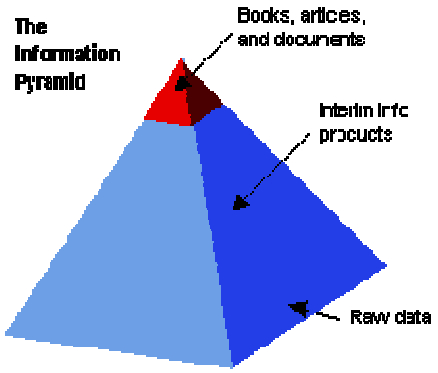


Figure 4.5: *Finding information*
Source: *http://www.gdrc.org/decision/info-decision.html*

(2) Processing the Knowledge

This where the information gathered is matched with the problem in hand. The relevant information from each source is extracted and information from multiple sources is organized. Which parts of the information collected needs to be used? What additional data or information is needed? How can information be best presented to be able to understand the situation and take decisions? The collected information is evaluated and integrated for its relevance, validity and interconnectedness.

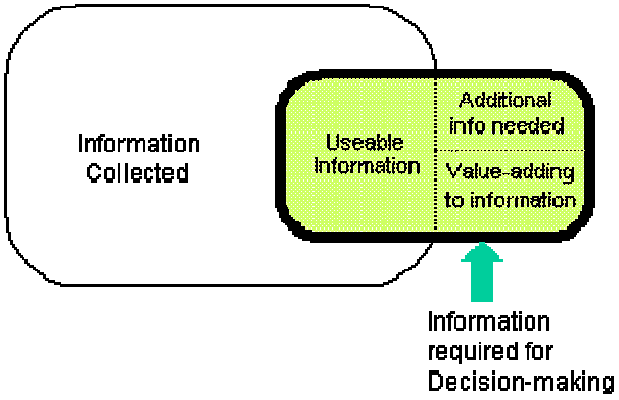


Figure 4.6: *Knowledge Processing*
Source: *http://www.gdrc.org/decision/info-decision.html*

(3) Taking the decision

In an interactive and inclusive process involving all the concerned parties, form an opinion from the information collected for its effectiveness and efficiency. Use it to take the decision. Has the decision taken help in solving the problem at hand? Was the decision satisfactory and took into account all the views of concerned parties? A decision taken may need to be examined closely and refined, and modified to meet differing needs over time.

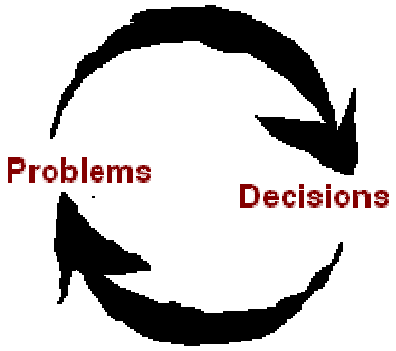


Figure 4.7: *Taking a decision*
Source: *http://www.gdrc.org/decision/info-decision.html*

Timely, appropriate and in–depth information is the prerequisite for sound decision making by both individuals and organizations. The value of information in this regard is tied to its ability to reduce uncertainty.

c) Awareness

Information is vital in getting people informed about goings – on around them. The value of information in this regard is appreciated in its ability to bridge the gap between those who know and those who do not know. Information is therefore the strongest single factor of mobilization.

d) Entertainment

This is another vital use of information. Most objects of entertainment convey a message to the viewers. Messages are simply packaged information.

e) Knowledge Acquisition

Data after processing translate into information. Also, when information is communicated, and is correctly interpreted and understood by the receiver, it translates to knowledge. Knowledge is being acquired through information on a day to day basis.

f) Other Uses of Information

These include the use of information for marketing, research, development, change, dieting, socio-economic function, behavior modification, diplomacy, policy-formulation, planning, safety, education, direction, competitive edge, forecasting, inventions, discovery, smooth running of organization, to correct impression, counseling, preservation or storage, empowerment, data analysis, politics, etc.

In Text Question

Knowledge is being acquired through information on a day to day basis. **True/False**

In Text Answer

False

4.2 Characteristics of Value of Information

The following are the characteristics of the value of information.

a) Value of information is a function of its use

The value of information depends on what the receiver wants to use it for. The pertinent question is: what is the extent of its benefit?

b) Subjectivity

Information is subjective. People don't attach the same value to the same piece of information. Information of very high value to someone may be valueless to another.

c) Value of information varies over time

The value of information varies with time, that is, it is not static. Value placed on it today may be different from what it will have in two years' time. Generally, we should bear it in mind that for something to be information, it doesn't have to be new. But it is news if it is new. Stale (old) information can also be provided but it has a lesser value, or even a zero value.

In Text Question

Information is ____

(a) Value
(b) Control
(c) Circulated
(d) Subjective

In Text Answer

The answer is (d) Subjective

4.3 Monetary Value of Information

An important question is: how can we put monetary value on information? There are different parameters people have suggested and we discuss some of them as follows:

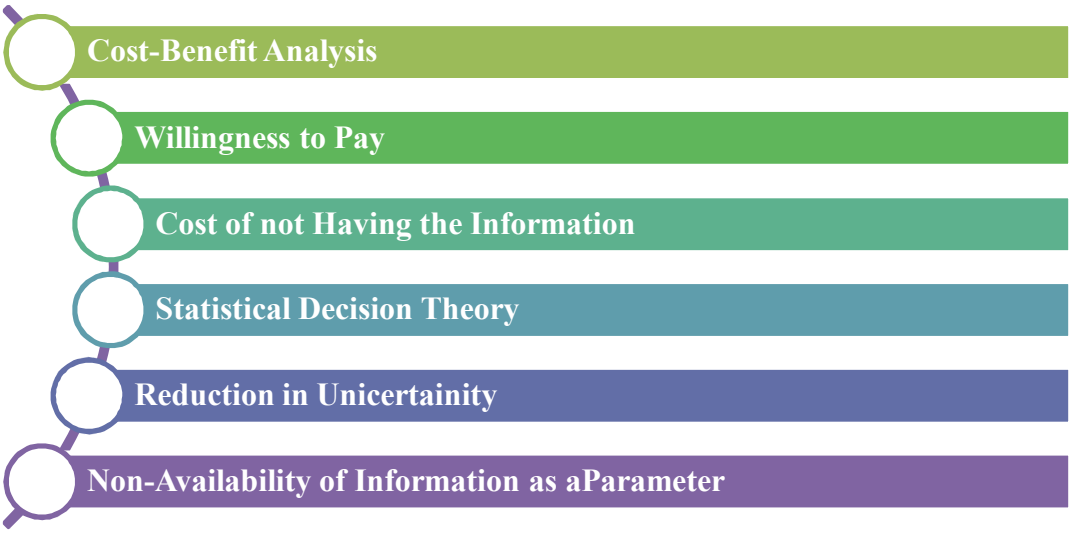


Figure 4.8: *Monetary Value of Function*

a) Cost-Benefit Analysis

Proponents of this parameter are interested in how much it will cost to get the information and what are the benefits derived from it when it is used? The benefits must outweigh the cost for the information to be desirable

b) Willingness to Pay

How much a potential user is ready to pay for a piece of information is often regarded as the cost of that information. For the same piece of information, two individuals might be ready to pay different amounts.

c) Cost of not having the Information

This refers to how much will someone loose for not having a particular piece of information, i.e. opportunity cost. For example, consider information needed for the use of a fire extinguisher.

You may not have information on how to use the fire extinguisher kept in your office. Then there was a fire outbreak in which a lot of money and office equipment got burnt. In this instance, the cost (value) of the piece of information on the use of the fire extinguisher which you did not have access to, is the estimate of the losses incurred.

d) Statistical Decision Theory

Here, the value of information entails the use of probability and expectation in supporting decision-making. For example, during the rainy season, the probability that it will rain on a particular day is high compared to the dry season. As a result, a piece of

information from a weather forecasting station would, expectedly, be higher than in the dry season.

e) Reduction in Uncertainty

This involves the use of Bayesian theory of conditional probability to determine the value of information. The proponents of this parameter consider the extent information has been able to reduce the position of uncertainty after receiving the information. With the piece of information, one should take a better decision.

f) Non-availability of Information as a Parameter

This involves the value of information in a negative sense. One needed particular information but it was not available to him. However, the person discovers that if he had the information, it would have been detrimental in that if he had made use of it, he would have made a wrong decision. The cost is how much he would have lost in monetary terms if he had used it. The non-availability pays off.

Summary from Study Session 4

In this study session, you have learnt the following:

Uses of Information to the society

- Problem Solving
- Decision Making
- Awareness
- Entertainment
- Knowledge Acquisition
- Other Uses of Information

Characteristics of Value of Information

- Value of information is a function of its use
- Subjectivity
- Value of information varies over time

Monetary Value of Information

- Cost-Benefit Analysis
- Willingness to Pay
- Cost of not Having the Information
- Statistical Decision Theory
- Reduction in Uncertainty
- Non-Availability of Information as a Parameter

Self-Assessment Questions (SAQs) for study session 4

Now that you have completed this study session, you can assess how well you have achieved its learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 4.1 (Testing Learning Outcomes 4.1)

List and explain the uses of information

SAQ 4.2 (Testing Learning Outcomes 4.2)

Highlight on the characteristics of Value of Information

SAQ 4.3 (Testing Learning Outcomes 4.3)

Discuss on Monetary Value of Information

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Study Session 5:

Expected duration: 1 week or 2 contact hours

Origin of Information Science

Source: *https://www.ebscohost.com/prod-mastheads/LibrayandInformtnSciSource_Masthead_Web.png*

Introduction

The way people define or view Information Science often differs from one discipline to another, probably because there is no clear-cut universal definition of the term information.

In particular, because of its close relationship to Library Science and Computer Science, many people consider the discipline to have emerged from these two latter disciplines while some even refer to it as glorified Library Science. This study session will provide in-depth definitions of Information Science, its emergence and origin as a discipline, and its historical development across the globe.

Learning Outcomes for Study Session 5

At the end of this study session, you should be able to:

5.1 Explain the Scope and Approach to Information Science
5.2 Discuss on Emergence of Information Science in Human Societies
5.3 Highlight on Origin of Information Science
5.4 Enumerate on Historical Development

5.1 Scope and approach

Information science focuses on understanding problems from the perspective of the stakeholders involved and then applying information and other technologies as needed. In other words, it tackles systemic problems first rather than individual pieces of technology within that system.

In this respect, one can see information science as a response to technological determinism, the belief that technology "develops by its own laws, that it realizes its own potential, limited only by the material resources available and the creativity of its developers. It must therefore be regarded as an autonomous system controlling and ultimately permeating all other subsystems of society."

Many universities have entire colleges, departments or schools devoted to the study of information science, while numerous information-science scholars work in disciplines such as communication, computer science, law, library science, and sociology. Several institutions have formed an I-School Caucus, but numerous others besides these also have comprehensive information foci.

Figure 5.1: *Library and Computer Library*
Source: *https://lagosbooksclub.files.wordpress.com/2012/11/library001.jpg?w=420*

5.1.1 Definitions of information science

An early definition of Information science (going back to 1968, the year when the American Documentation Institute renamed itself as the American Society for Information Science and Technology) states:

"Information science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization of information.

This includes the investigation of information representations in both natural and artificial systems, the use of codes for efficient message transmission, and the study of information processing devices and techniques such as computers and their programming systems.

It is an interdisciplinary science derived from and related to such fields as mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science, management, and other similar fields. It has both a pure science component, which inquiries into the subject without regard to its application, and an applied science component, which develops services and products." (Borko, 1968, p.3).

Some authors use informatics as a synonym for information science. This is especially true when related to the concept developed by A. I. Mikhailov and other Soviet authors in the mid-1960s. The Mikhailov School saw informatics as a discipline related to the study of scientific information. Informatics is difficult to precisely define because of the rapidly evolving and interdisciplinary nature of the field.

Definitions reliant on the nature of the tools used for deriving meaningful information from data are emerging in Informatics academic programs. Regional differences and international terminology complicate the problem. Some people note that much of what is called "Informatics" today was once called "Information Science" - at least in fields such as Medical Informatics.

For example, when library scientists began also to use the phrase "Information Science" to refer to their work, the term "informatics" emerged in the United States as a response by computer scientists to distinguish their work from that of library science in Britain as a term for a science of information that studies natural, as well as artificial or engineered, information-processing systems.

Another term discussed as a synonym for "information studies" is "information systems". Brian Campbell Vickery's Information Systems (1973) places information systems within IS. Ellis, Allen, & Wilson (1999), on the other hand, provide a bibliometric investigation describing the relation between two different fields: "information science" and "information systems”**.**

Information Science in a particular way or giving a particular definition might be difficult because different people can define it in several ways and the definitions differ not only between and within disciplines but also as a function of the time when they were defined. Moreover, information is a diffuse concept that plays a fundamental role across a wide range of activities and disciplines.

Information Science supplies fundamental ideas to other fields or disciplines. It cannot be viewed on its own without considering its origin and relationship with other disciplines or fields.

In Text Question
Information Science It is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization of information. **True/False**

In Text Answer
True

5.1.2 The following are a few definitions of Information Science

Information science is concerned with information in all its different realities, and how it is or might be efficiently created, organized, stored, retrieved, disseminated and used.

A much cited definition was provided by

Borko (1968) as:
"an inter-disciplinary science that investigates the properties and behaviour of information, the forces that govern the flow and use of information, and the processing of information for optimal storage, retrieval, and dissemination".

The processes include the origination, collection, organization, interpretation, storage, retrieval, dissemination and use of information. Another definition is that it is concerned with the principles and practice of information. To this end, it includes the study of information from its generation to its exploitation and of its transmission in a variety of channels.

5.1.3 Philosophy of information

Philosophy of information (PI) studies conceptual issues arising at the intersection of computer science, information technology, and philosophy. It includes the investigation of the conceptual nature and basic principles of information, including its dynamics, utilization and sciences, as well as the elaboration and application of information-theoretic and computational methodologies to its philosophical problems.

5.2 Emergence of Information Science in Human Societies

Compared to other disciplines, the emergence of information science as a discipline focusing on the general principles of the creation, organization, storage, dissemination and use of information in human societies is relatively recent, being not much older than the advent of the information age in our modern society.

However, the principles of Information Science are as old as the creation and communication of information and knowledge. Thus, in a sense, practical Information Science predates all other disciplines.

For instance, in order to minimize the probability of non-reception, inadequate understanding or complete misunderstanding of the intended meaning (information), communication in ancient societies would have involved the application of the same basic principles of the optimal selection and use of communication symbols, media and channels, as would the modern-day author of a scientific journal article, editor of a daily tabloid, a TV broadcaster, a musician, or a designer of a human-computer interface.

Similarly, people use a wide variety of methods to efficiently store and retrieve information in their daily living. They often use simpler codes to represent larger chunks of information in their memory to ensure effective recall of the information as needed. They also group objects on the basis of the innate information exuded by the objects in ways that enhance the ease of subsequent retrieval of the objects.

Information organization and storage techniques, as well as retrieval and browsing considerations are involved in such diverse tasks as the grouping and/or arrangement of items in a personal collection of books or music records, items of clothing in a wardrobe, employee files in an office cabinet, products in a grocery store, words in a dictionary, electronic files in sub-directories of a computer disk, etc.

Of course, we are all aware of the problem we often encounter when we need to retrieve specific items from any large collection of unorganized items! Literate people are used to the alphabetical method of ordering or searching for information items, such as the words in a dictionary.

The above are only a few of the principles that are researched and practiced in information science. As a universally-relevant and applicable discipline, Information Science and scientists seek to identify, develop, evaluate and consistently and efficiently apply such principles to the processes of information creation, organization, storage, retrieval, dissemination and utilization.

Information Science concerns itself with getting the right information to the right person at the right time. You create /collect information but the information may not be useful. So we process it and put it in the form the user will want it.

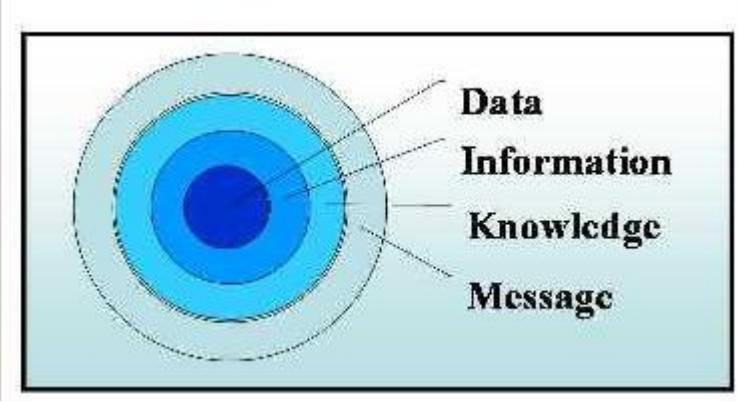

Figure 5.2: *Information Science*
Source: *http://www.capurro.de/zins1.jpg*

5.3 Origin of Information Science

The definition that arose in the conferences of the Georgia Institute of Technology, USA which took place in October 1961 and April 1962 reused and republished by Harold Borko in 1968 is still valid and with a strong programmatic nature.

It is the subject that researches the properties and the behavior of **INFORMATION**, the forces that govern the information flow and the means of information processing for the optimization of access and use. It is related to a body of **KNOWLEDGE** which includes the origin, collection, organization, storage, retrieval, interpretation, transmission, transformation and use of information.

This includes research, the representations of information both in the natural and the artificial systems, the use of codes for the efficient transmission of messages and the study of information processing services and techniques and its programming systems.

Although it is valid and current, it can and should be improved and released from some contradictions, such as the acceptance without criticism of the interdisciplinary natured derived from and related to several fields, such as mathematics, logic, linguistics, psychology, computational technology, search operations, graphic arts, communications, library studies and management.

Similar fields or as the postulate of a component of pure science that questions the subject without taking its application into consideration, as a component of applied science, which develops products and services. The assumption of an interdisciplinary nature contradicts the evident need, in the beginning of the definition, to give specific and clear limits to the specific object of study.

Therefore, you defend that Information Science is a social science that researches the problems, themes and cases related to the info-communicational phenomenon perceptible and cognoscible through the confirmation or not of the properties which are inherent to the origin of the information flow, organization of information and information behavior (origin, collection, organization, storage, retrieval, interpretation, transmission, transformation and use of information).

In Text Question
Information Science related to a body of _____
(a) Message
(b) Process
(c) Knowledge
(d) Input
In Text Answer
The answer is (c) Knowledge

5.4 Historical Development

The name "information scientist" was first coined in 1953 (Farradane, 1953). The term described a scientist who was also information professional. In 1955, the term "information science" was invented implying that it represented an academic discipline rather than a professional activity.

The motive behind the introduction of the terms "information scientist" and "information science" is in distinguishing the activities of information professionals from those of librarians. Information scientists were characterized as being proactive (taking the initiative) in searching and scanning the literature and presenting the results to their clients.

They also add value to their work by evaluating the literature they searched, ignoring low-quality materials, and drawing attention to certain key references. From 1955 when the term "information science" was invented (Faradane, 1955), the following developments in the discipline have taken place:

In 1958, there was an international conference on scientific information held in Washington D.C. At the meeting people from various disciplines came together to deliberate on how information resources could be properly handled. Also in the same year, the Institute of Information Scientists (IIS) was founded in London.

In 1961, there was another conference that was the first International Congress on Information Science Systems in Hot springs, Virginia, U.S.A. It equally attracted people from different disciplines deliberating on the need for proper handling of information and their deliberation centred on what should be the content of the discipline called Information Science.

In 1967, there was the establishment of the first autonomous department of Information Science in the University of Dayton in USA which provided for undergraduate and postgraduate training in Information Science. In 1968, the American Society for Information Science that was formerly American Documentation Institute came up with the new nomenclature ASIS.

In 1970, the American Society for Information Science changed the name of its journal to Journal of American society of Information Science. In 1979, the Institute of Information Scientists in Britain established its own journal called the Journal of Information Scientists.

In Africa, the University of Ibadan's Department of Library Studies was changed to Library, Archival and Information Studies in 1986. In Kenya at the university of Nairobi, there is Faculty of Information which encompasses Library studies as well as Information Studies courses.

In English speaking East Africa, the School of Information Science for Africa (SISA) was established in January 1, 1990 at Addis Ababa University, Ethiopia. The school was being sponsored by International Development Research Centre (IDRC) and UNESCO.

In October 1, 1990 the Africa Regional Centre for Information Science (ARCIS), University of Ibadan, was established. ARCIS is solely meant for West African students and it was founded by IDRC and UNESCO.

Since then, there have been several schools or departments of Information Science established across Nigerian universities. In October 1, 1994 there was the establishment of CIMA (Centre for Information Management) in Botswana.

Presently, there is a consortium of African Schools of Information Science with the headquarters in ETHIOPIA. The consortium is meant to regulate the practice of Information Science in Africa, especially in the areas of collaboration, research, bursary award, study visits as well as staff and student exchange programs.

Figure 5.3: *Origin of Information Science*
Source:*https://upload.wikimedia.org/wikipedia/commons/thumb/6/64/Ancientlibraryalex.jpg/262px-Ancientlibraryalex.jpg*

Summary from Study Session 5

In this study session, you have learnt the following:

1. **Definitions of information science**
   "Information science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability.
2. **Emergence of Information Science in Human Societies**
   Compared to other disciplines, the emergence of information science as a discipline focusing on the general principles of the creation, organization, storage, dissemination and use of information in human societies is relatively recent, being not much older than the advent of the information age in our modern society.
3. **Origin of Information Science**
   The definition that arose in the conferences of the Georgia Institute of Technology, USA which took place in October 1961 and April 1962 reused and republished by Harold Borko in 1968 is still valid and with a strong programmatic nature.
   It is the subject that researches the properties and the behavior of **INFORMATION**, the forces that govern the information flow and the means of information processing for the optimization of access and use. It is related to a body of **KNOWLEDGE** which includes the origin, collection, organization, storage, retrieval, interpretation, transmission, transformation and use of information.

This includes research, the representations of information both in the natural and the artificial systems, the use of codes for the efficient transmission of messages and the study of information processing services and techniques and its programming systems.

4. **Historical Development**

The name "information scientist" was first coined in 1953 (Farradane, 1953). The term described a scientist who was also information professional. In 1955, the term "information science" was invented implying that it represented an academic discipline rather than a professional activity.

Self-Assessment Questions (SAQs) for study session 5

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 5.1 (Testing Learning Outcomes 5.1)
Define Information Science

SAQ 5.2 (Testing Learning Outcomes 5.2)
Explain the Emergence of Information Science

SAQ 5.3 (Testing Learning Outcomes 5.3)
Enumerate on the Origin of Information Science

SAQ 5.4 (Testing Learning Outcomes 5.4)
Discuss on the historical Development

References

Borko, H (1968). Information Science: What is it? American Documentation, 19, 3-5

Popoola, A. O. (2002). Freedom of Information and the Enhancement of Citizens' Participation in Democratic Governance: Doctrinal and Comparative Perspective. In: The Advocate: The International Journal of the Law Students' Society (Obafemi Awolowo University, Ile-Ife), Vol. 21, pp. 51-61

Study Session 6: Expected duration: 1 week or 2 contact hours

Locating Information Science in Disciplinary Space

Introduction

In this study session you shall describe the current subject focus of Information Science in relation to other disciplines, and as a starting point of effort we should strive to define an appropriate curriculum for Information Science.

You will attempt to locate Information Science in 'disciplinary space' in terms of how its subject focus is related to, coupled with, and/or borrows or applies knowledge from other disciplinary fields. Furthermore, you will highlight the need for Information Science as a discipline.

Learning outcomes for Study Session 6

At the end of this study session, you should be able to:

6.1 Explain the Disciplinary focus of Information Science
6.2 Discuss the Need for Information Science

6.1 Disciplinary Focus of Information Science

In his introduction to the first volume of the Annual Review of Information Science and Technology in 1966, **Carlos Caudra** noted the controversy then surrounding the disciplinary focus of 'Information science'.

He noted the differing emphasis of various groups of Information Scientists who either saw their field as 'glorified library science' or in terms of 'machine manipulations of linguistic, pictorial or numeric data', or as 'a distinct field dealing largely with the processing and/or analysis of scientific and technical documents', or as a behavioural field focusing on 'inter-personal communication', of which both computer and document handling methods are important but limited aspects'.

Respectively, these were the institutional (library), machine-computational, documentation, and human communication, views of Information Science.

Today, the question of the subject matter of Information Science is still controversial, although most of its practitioners are now inclined to support the views, also noted by Caudra that Information Science is a generalized information discipline whose principles

have been, and are being distilled and synthesized from the more specialized disciplines of library science, computer science, documentation science, and communication arts.

As a young discipline, Information Science is still evolving. Here, and subsequently, we shall attempt to paint what appears to be the current location of Information Science in disciplinary space by examining the extent to which Information Science presently overlaps, synthesizes and/or applies the subject matter of other disciplines.

Scientists often speak of an information life-cycle of sequential processes through which information might undergo: creation, organization, storage, retrieval, dissemination, presentation, and use.

However, communication arts, computer science, and library science have their respective strengths and weaknesses relative to the information life-cycle in that they respectively emphasize and specialize in the human, machine and documentary contexts for the generation and use of information.

Information Science, being an attempt at synthesizing these disciplines and many others, seek to provide a broader and more generalized understanding of all human communication and information processes and systems.

Figure 6.1: *Carlos Caudra*
Source: *https://versal.org/static/img/carlos.png*

6.1.1 Disciplinary unit from the perspective of the relations between knowledge generation and professional practice, between academia and professionals

Convergence between thought and action should be indissoluble, at least partially or in varied ways according to the areas of knowledge and practice of library and information science.
You believe this is the first level of fragmentation, and you are glad that this Conference addresses this as a theme to be studied and debated. It never ceases to amaze us that you

as scholars and professionals of information and knowledge processes present this weakness.
Internal relations between academia, mostly university professors and researchers, and professionals are poor according to our vision of Uruguay, but also in other countries where you have carried out academic internships.
In general, in library and information science events and publications participate a group characterized by not practicing professionally and by being relatively isolated from the discipline's everyday practice and issues.
Through in-depth interviews to professors, students and professionals, you gathered data that indicate a low perception of the research lines and projects in spite of the reduced field where they are spread: a small country with a single library and information science School.
Probably this phenomenon also occurs in your countries. It would be interesting to know of similar investigations, which probably exist, but we have been unable to retrieve, about the perceptions of the aforementioned actors and to carry out a comparative analysis.
Undoubtedly the strong institutionalism, organizational behaviours not prone to change, and the attachment to praxis that is not always accompanied by an awareness of its underlying theory, have influence on professional practice.
But also, in academia there is little awareness of the important role played by professionals in favouring the back-and-forth of knowledge and experiences between academy and society.
In this sense, we must overcome this first level of fragmentation. We won't be able to move forward and achieve outward impacts if we are not capable of overcoming the incidence of inward knowledge generation.
It would be desirable to convert the concentric circles in spirals promoting the joint growth of information disciplines in a smooth exchange with the professional community.
The articulation of university research in library and information science with the other university functions: teaching and extension.
A second level of fragmentation, stronger or weaker depending on university policies, may occur following the degree of the relation between the three functions that are considered the pillars of university work: research, teaching and extension. Knowledge generation is not always linked to teaching and university extension, in such a way that an enriching bidirectionality may exist for both students and society.
It is frequent for library and information science researchers as well as for their peers in other disciplines not to practice as teachers. This hinders the flow of research experiences as well as a bigger enthusiasm for research. Even more, it hinders the development of professionals with a research and innovative attitude on their working areas.
In this sense, we feel there is a need to approach the complex processes of teaching, research and extension with an integrative, real and deep perspective.

Articulation between the three university functions is favoured by a theoretical and methodological approach to action research in library and information science, especially when developed in the Information and Society area.
This kind of approach is characterised by a sustained reflection on the reality studied, not only to know of it but also to transform it together with the target community (subject-object of research), that participates of the different stages and appropriates the results.
Likewise, "the action research spiral entails the connection with other disciplines and its academic actors, and adds them in a critic and creative way to the comprehension dynamics of interdisciplinary phenomena. Creating circumstances and mechanisms that promote interdisciplinary attitudes, habits and ways of working, fostering the integration of knowledge and experiences is inherent to this approach" (Sabelli 2006-2008).
Thus, you favour a more intimate and dialectic interrelationship between theory and practice and at the same times the emergence of problems that guide the research formulation according to the need of the subject-object of research.

In Text Question

The action research spiral entails the connection with other disciplines and its academic actors, and adds them in a critic and creative way to the comprehension dynamics of interdisciplinary phenomena. **True/False**

In Text Answer

True

6.1.2 The approach of research problems as facilitators or barriers for disciplinary unit

The desirable convergence between information disciplines' theory and practice depends mostly on the approach of research problems, both in their selection as in their theoretical and methodological approach. In this process it is important to become aware of the theory supporting the approach, overcoming the attachment to reality required of library and information science knowledge to solve more pragmatic issues.
Maybe one of the best ways to overcome the aforementioned fragmentations is through the solution of information problems, from interdisciplinary views, with a strong anchorage in the subject-object of research, in a collaborative way with the target community.

6.1.3 Library and information science articulation aimed at promoting information public policies

A fourth aspect to take into account is the direct connection between the existence of a strong and professionally consolidated discipline and the promotion of information public policies.
As we have already mentioned, it is crucial to overcome fragmentations between academia and the professional community, because this is the essential bridge to the social environment and the relationship with governmental actors. It is incumbent on

them the inclusion in the public policies agenda of plans and programmes related to access and use of information.
The discipline grows through them, generating new knowledge and practices. Review of professional practices and research experiences: towards an integrative and interdisciplinary view. A dialogue with the accumulated work and knowledge in thirty years of professional practice and research with others.
As you mentioned at the beginning of this presentation, in this second part we review and discuss the aforementioned ideas in light of our experience in library and information science research projects since 1990 to date, with a history since 1979.
The starting point (1979) finds us leading a documentation centre and designing information and documentation projects in a private centre for research in social sciences.
A group of senior researchers, sociologists, demographers, political scientists and other social sciences experts, who had occupied a major role at the University of the Republic (hereafter, 'the University') until its intervention by the authoritarian government (1974) were involved in it.
There is a consensus in considering them as a fundamental section of the Uruguayan intelligentsia in social sciences who could stay in the country.
Another line of research and documentary practice from the Centro de Informaciones, which allowed tightening bonds with academics and especially with planners focused on social policies. First, a 1996 research project about the state-of-the-art of social policy in Uruguay, Argentina and Chile from 1985 to 1996.
Secondly, the design of the Information Network on Social Policy in Latin America, by request of the International Development Research Centre's Social Sciences Division (1997-1998).
To sum up, in both lines it is shown the selection and approach of research problems as major facilitators of a view of library and information science as information disciplines, and its strong integration with other social disciplines, as well as its relationship with social public policies.
From this period of the 1980s and part of the 1990s, and in these areas of research and professional practice, I would like to underline the remarkable role played by the International Development Research Centre's Information Sciences Division, supporting information and documentation programmes and projects promoting social development.
Also, the Latin American Population Documentation System and the Latin American Centre for Economic and Social Documentation acted as centres for the development of knowledge, theory and dissemination of information processing technology. It is likely that the reality of library and information science in the social sciences area in Latin America during these years, with several private research academic centres, small in size but with a significant contribution in knowledge generation, has not been duly acknowledged and remembered by the yet-to-be-written history of library and information science development in the region.
At these centres there were libraries and/or documentation centres that collaborated with researchers in an interdisciplinary way and, for the most part, participated in information

networks promoted by the Latin American Centre for Economic and Social Documentation and the Latin American Social Sciences Council, while they were being supported by diverse organizms and foundations.
What we would like to highlight at this Conference is that, at that time and in that particular context, library and information science theory and practice were integrated and there existed a profuse interdisciplinary.
It is likely that the political situation, the reduced and fermentative spaces of interaction between researchers and information professionals at libraries, but also at offices, corridors, and even at shared lunches, fostered an information and documentation research attitude and aptitude.
At the same time there was an academic exchange at regional events, organized by the Latin American Population Documentation System, the Latin American Centre for Economic and Social Documentation or the Latin American Council of Social Sciences, where information professionals got together with researchers and planners.
The Information and Development Series, published by the Latin American Centre for Economic and Social Documentation at the time, is the clearest expression of the eagerness to unite theory to library and information science professional practice in an information disciplines context.
In this exchange at meetings there was fragmentation between different areas and information disciplines, nor between their professionals. I believe there is a lot to be learned from that time period which characterized by the creation of databases and automated catalogues, the design and use of thesauri and especially by sharing free, high-quality resources and by a close cooperation and exchange through networks.
Inward fragmentation did not exist or was very weak in the discipline and professional practice. The theory and practice of information analysis, services management, formats, and new technology incorporation was shared.
At the same time, by the end of the 1980s and beginning of the 1990s we became interested (because of our other degree as Professor of History) in the concepts and vocabulary involved in the teaching of History.
Throughout this investigation we were not conscious of being linking two knowledge areas, the didactics of history and information acience, since the basic final product was a conceptual map or thesaurus based in study texts from different countries, students' notebooks and interviews to history teachers.
You believe it was another experience where different theories with similar approaches, from separate disciplines, got together. It may be an example of fragmentation between theories and practices that should get closer and acquainted. In the next section we will mention the people who acted as reference points at this stage and their incidence in our research lines and teaching.
In the year 1992, together with our colleague Professor María Cristina Pérez Giffoni from the School of Library Science and Related Areas (hereafter, 'the School'), we started a research line and teaching in user studies.

Makers, dairy producers and technicians, University of the Repuglic academics, and citizens in vulnerable situations. In all of these projects we worked with interdisciplinary teams formed by senior and junior researchers as well as students of the School.

If we analyse these varied and rich research experiences in light of the ideas mentioned in the first part of our presentation, we may conclude that approaching the different problems faced by users entailed the imperious need of nurturing from the appropriate theory and methodological approaches.

Each one of the projects meant (beyond similar perspectives) a different approach to the user (subject-object of research) given their special features, contexts, everyday life or role at their organizations. They also contributed an exchange with different kind of mediators (government and university decision-makers, union leaders, information professionals, social services professionals and technicians).

These two aspects were incorporated into teaching. In 1993, together with Prof. Cristina Pérez Giffoni we designed a user studies course for the last year of the School's degree in library science, which is available as an elective course. Thus, the student acquires the conceptual framework that allows reflecting on the theories and research methods of the cases selected from the international bibliography and national examples.

Since the implementation of the current Syllabus in 1987, from 1991 to 2008 there have been eleven dissertations related to user studies. The different categories of studied users include: dairy producers and technicians, university researchers and teachers, disabled university students, notaries, legislators, employees, school teachers, and imprisoned women: political prisoners and ordinary prisoners.

Therefore we see the inward attempts at articulating the teaching and research functions for the degree in library science. Still pending is the development of broader projects, integrated to other information disciplines through interdisciplinary teams, as well as to add the university extension function to them.

One of the research projects currently being developed (2009-2010) aims to this end. It was selected by Scientific Research Council in their 2008 call for Social Inclusion Projects and refers to action research of social inclusion and information, aimed at women in vulnerable situations. We will refer to it in the last part of the presentation.

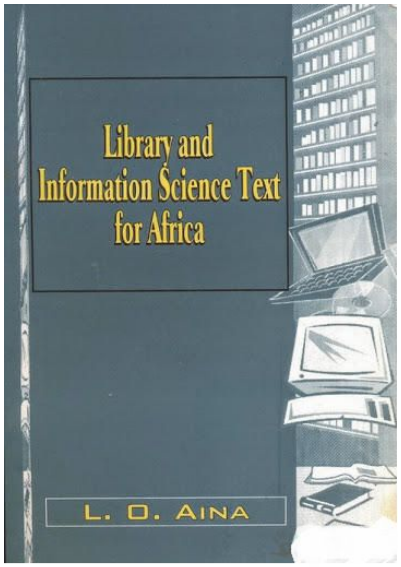

Figure 6.2: *Library and Information Science*
Source: *http://c.mobofree.com/m/5/5432581d5665ed24208b4568_1024x768/Library-and-information-science-text-for-Africa-L-O-Aina-Books-Cds-DVDs-For-sale-at-All-Nigeria.jpg*

6.2 The Need for Information Science

Information Science as a discipline aims to provide a body of information that will lead to improvements in the various institutions and procedure dedicated to the accumulation and transmission of knowledge. There are in existence a number of such institutions and related media.

These include books for packaging knowledge; schools for teaching the accumulated knowledge of many generations; libraries for storing and disseminating knowledge; movies and television for the visual display of knowledge; journals for the written communication of the latest technical advances in specialized fields; and conferences for the oral communication of knowledge.

These institutions have served, and continue to serve, very useful functions, but they are inadequate to meet the communication needs of today's society. Some of the factors that contribute to their inadequacies are:

The tremendous growth in science and technology and the accelerated pace at which new knowledge becomes available.The increased specialization which makes communication and exchange of information among disciplines very difficult.

As a result of these pressures, the hitherto methods for exchanging information (without Information Science) have been found wanting. If communication and information exchange procedures are not improved all other scientific work will be impeded, and the lack of communication will result in duplication of effort and a slowing of progress.

Therefore, the importance of Information Science and the reasons for the current emphasis upon this discipline cannot be over-emphasized.

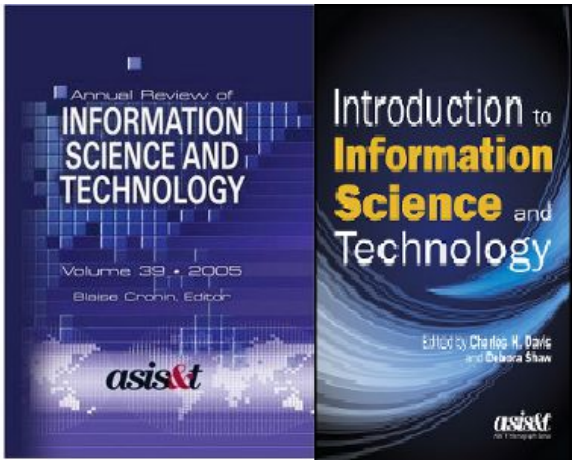

Figure 6.3: *Books on Information Science and Technology*
Science: *http://www.ariadne.ac.uk/sites/default/files/book-image/annual-review-information-science-technology-volume-39.jpg*

Summary from Study Session 6

In this study session, you have learnt the following:

1. **Disciplinary Focus of Information Science**
   Difference emphasis of various groups of Information Scientists who either saw their field as 'glorified library science' or in terms of 'machine manipulations of linguistic, pictorial or numeric data', or as 'a distinct field dealing largely with the processing and/or analysis of scientific and technical documents', or as a behavioural field focusing on 'inter-personal communication', of which both computer and document handling methods are important but limited aspects'.

2. **The Need for Information Science**
   Information Science as a discipline aims to provide a body of information that will lead to improvements in the various institutions and procedure dedicated to the accumulation and transmission of knowledge. There are in existence a number of such institutions and related media.

Self-Assessment Questions (SAQs) for study session 6

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 6.1 (Testing Learning Outcomes 6.1)

Explain the Disciplinary Focus of Information Science

SAQ 6.2 (Testing Learning Outcomes 6.2)

Discuss the Need for Information Science

References

Caudra, C. (1966). Introduction to the ADI Annual Review. Annual Review of Information Science and Technology, 1, 1-14

Khosrow-Pour, Mehdi (2005). Encyclopedia of Information Science and Technology. Idea Group Reference ISBN 159140553X

Shapiro, F.R. (2005). Coinage of the Term “Information Science”. Journal of the American Society for Information Science, 46(12)

Study Session 7:

Expected duration: 1 week or 2 contact hours

Relationship of Information Science to the Sister Disciplines

Introduction

The theoretical core of Information Science is a synthesis of many subjects. Presently, however, three disciplines appear more closely coupled with Information Science than the others (hence they are often referred to as sister disciplines).

These are, in alphabetical order, communication arts, computer science, and library science. Information science is the modern day attempt to synthesize general knowledge on information processes from these three more specialized information disciplines and others.

Learning Outcomes for Study Session 7

At the end of this study session, you should be able to:

7.1 Explain the relationship between Information Science and Communication Art
7.2 Highlight on the relationship between Information Science and Library Science
7.3 Relations between library science, information science and LIS

7.1 Information Science and Communication Arts

Communication arts focus on the effective communication of information symbols in different settings. Forms of communication also vary from the **non-verbal, to the oral, to the written.** Communication arts focus on the real-time transfer of information symbols over personal, social and terrestrial space, and on telecommunication media and channels.

However, emphasis has generally been on communication processes dominated by human behaviour. Communication arts integrate knowledge from a wide range of arts/humanities disciplines (philosophy, linguistics, etc.) as well as some social science disciplines (in particular psychology and sociology).

Traditionally, the focus of communication arts had been on the development, application and social use of language and other communication symbols and techniques to achieve

specific effects in different contexts, and on the effective elicitation and dissemination of information.

Thus in comparison with other information disciplines, communication arts have been generally weaker in their orientation towards information storage and retrieval processes in the information life-cycle.

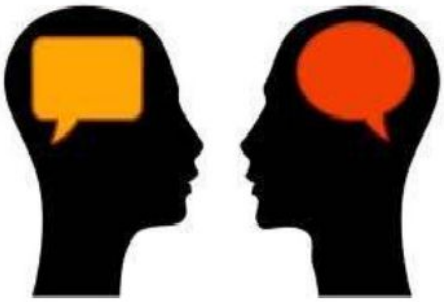

***Figure** 7.1: Art and Science of Communication*
***Source:** http://image.slidesharecdn.com/artandscienceofcommunication7-2-130716001118-phpapp01/95/art-and-science-of-communication-7-2-1-638.jpg?cb=1373942419*

7.1.1 Information Science and Computer Science

Many people often consider Information Science to be synonymous with computer science, which is not correct. Computer science is concerned with developing and applying electromechanical means (equipment, software, procedures) to the production, storage, retrieval, dissemination, communication and use of information.

In contrast, information science is concerned with the same information processes but from all perspectives - electromechanical, human, and documentary and others. Clearly, the aims of both information science and computer science overlap substantially.

Rapid developments in computer and related technologies have been transforming the ways in which human societies are creating, handling, communicating and using information.

Indeed there is hardly any aspect of human information and communication processes that have not been influenced or transformed by these developments Nevertheless, electromechanical information systems are, and would most likely remain but a subset of human information and communication systems in general.

Whereas computer science (in conjunction with the electronic and electrical sciences) focuses on creating and developing new and more efficient computer hardware and

software technologies for processing, storing and transferring information, the focus of information science is more on utilizing and evaluating the appropriateness of alternative (electromechanical, human documentary, etc.) approaches to human information, and communication processes in different social settings.

Thus Information Science helps to provide feedback to the computer and electronic sciences on the practical relevance and usefulness of electromechanical technologies in human information activities, thereby informing the development of improved technologies.

Computer science deals mainly with data processing not minding how the data originated. Information science embodies data processing. The computer scientist makes use of the computer to make processing easier and faster.

The information scientist is interested in all the activities in the life cycle of information - from the information definition, through usage until its eventual disposal, i.e. the information scientists start their roles in the information life cycle before the computer scientists come in and they (information scientists) are also interested in what happens after information might have been processed and disseminated.

In Information Science, computers are used as tools in the processing, organization, storage and retrieval as well as dissemination of information. Computer scientists make processing and handling of information easier and faster through hardware and software uses.

Information scientists are also interested in hardware and software uses but go a step further to evaluate what happens to data or information after they might have been disseminated to end users.

In Text Question
Computer science is concerned with developing and applying electromechanical means to the production, storage, retrieval, dissemination, communication and use of information.
True/False
In Text Answer
True

7.2 Information Science and Library Science

Information science has its antecedents in library science, largely because until the computer revolution of the post-world war II era, the most enduring media for social communication was the paper document, and libraries and archives had for centuries been serving society as the repositories for such communication artifacts.

Librarians, archivists and curators were the first information specialists to practice and experiment with the fundamental principles of information science, albeit within the contexts of libraries, archives and museums. For example, although the theory of subject classification is rooted in philosophy, it was in the library that it found extensive practical application, testing, evaluation, and development.

Efficiently storing and retrieving information in documents has been library science's traditional area of strength, from which other information disciplines have been benefiting, and could even further benefit.

Indeed, computer science has found such principles very useful in the design of more efficient database structures and software for storing and retrieving information from electronic data stores. For instance, hierarchical subject indexes and links are now used for organizing information at most internet sites.

Library science deals with organization of knowledge**:** the classification, storage and retrieval of knowledge. Librarianship deals with the application/practice of library science. Library scientists deal with recorded information but information scientists are concerned with information in whatever form.

Library science deals with finished information products in the confines of the library while information science deals with the phenomenon called information. Library science also deals mainly with document retrieval systems but information science equally has aspects bordering on document retrieval system.

Librarians equally engage in designing management information systems but within the confines of the library but information science cuts across other areas like designing a system for geologists, bankers, lawyers, educationists, etc. Document retrieval systems are another concern of library scientists but information science goes beyond that, e.g. expert systems, design and management of numeric databases, etc.

Nevertheless, information science equally borrows some ideas from library science like classification. This is called clustering in information science. Also indexing and abstracting are other aspects borrowed.
Information science borrows heavily from the practical experimental knowledge, especially of information storage and retrieval over the centuries. It was no accident that information science began as 'documentation science'.

However, information science has been able to break away from the narrower and more specialized library context of library science by integrating knowledge from both computer science and communication arts.

The proceeding must not be construed to imply the superiority of one discipline to the other, but that there are inherent advantages and limitations in the respective broader and narrower focus of information science and library science.

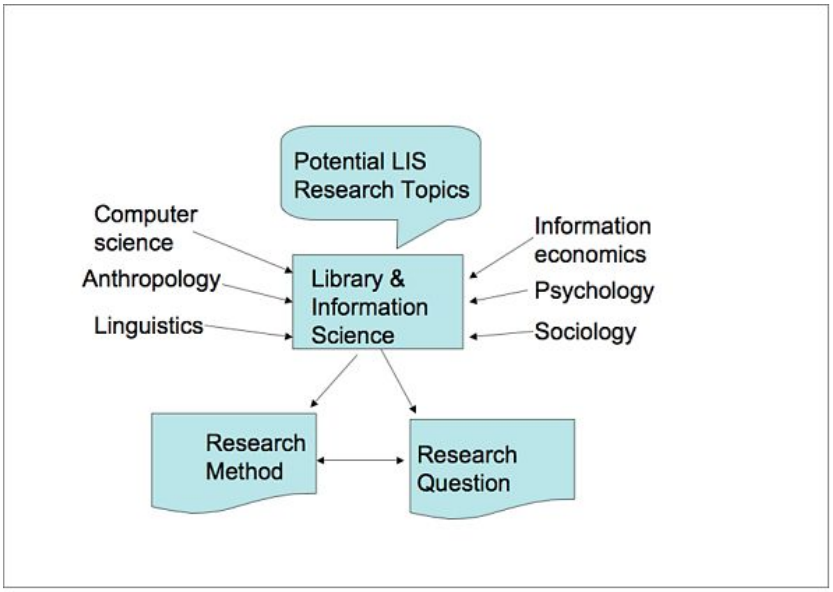

Figure 7.2: *Library and Information Science*
Source: *http://www.informationr.net/ir/12-4/colis/colise02fig3.png*

7.3 Relations between library science, information science and LIS

The common ground between library science and information science, which is a strong one, is in the sharing of their social role and in their general concern with the problems of effective utilization of graphic records.

But there are also very significant differences in several critical respects, among them in:

(1) Selection of problems addressed and in the way they were defined;
(2) Theoretical questions asked and frameworks established;
(3) The nature and degree of experimentation and empirical development and the resulting practical knowledge/competencies derived;
(4) Tools and approaches used;
(5) The nature and strength of interdisciplinary relations established and the dependence of the progress and evolution of interdisciplinary approaches.

All of these differences warrant the conclusion that librarianship and information science are two different fields in a strong interdisciplinary relation, rather than one and the same field, or one being a special case of the other."

It should be considered that information science grew out of documentation science and therefore has a tradition for considering scientific and scholarly communication, bibliographic databases, subject knowledge and terminology etc. Library science, on the

other hand has mostly concentrated on libraries and their internal processes and best practices.

It is also relevant to consider that information science used to be done by scientists, while librarianship has been split between public libraries and scholarly research libraries. Library schools have mainly educated librarians for public libraries and not shown much interest in scientific communication and documentation.

When information scientists from 1964 entered library schools, they brought with them competencies in relation to information retrieval in subject databases, including concepts such as recall and precision, boolean search techniques, query formulation and related issues.

Subject bibliographic databases and citation indexes provided a major step forward in information dissemination - and also in the curriculum at library schools.

Julian Warner (2010) suggests that the information and computer science tradition in information retrieval may broadly be characterized as query transformation, with the query articulated verbally by the user in advance of searching and then transformed by a system into a set of records. From librarianship and indexing, on the other hand, has been an implicit stress on selection power enabling the user to make relevant selections.

In Text Question

The common ground between library science and information science is the _____

(a) Information Search

(b) Information gathering

(c) Sharing of their social role

(d) Recording of Information

In Text Answer

The answer is (c) Sharing of their social role

Summary from Study Session 7

In this study session, you have learnt the following:

1. **Information Science and Communication Arts**
   Communication arts focus on the effective communication of information symbols in different settings. Forms of communication also vary from the non-verbal, to the oral, to the written. Communication arts focus on the real-time transfer of information symbols over personal, social and terrestrial space, and on telecommunication media and channels.
2. **Information Science and Library Science**
   Information science has its antecedents in library science, largely because until the computer revolution of the post-world war II era, the most enduring media for social communication was the paper document, and libraries and archives had for centuries been serving society as the repositories for such communication artifacts.

3. **Relations between library science, information science and LIS**

Significant differences in several critical respects, among them are:

(1) Selection of problems addressed and in the way they were defined;
(2) Theoretical questions asked and frameworks established;
(3) The nature and degree of experimentation and empirical development and the resulting practical knowledge/competencies derived;
(4) Tools and approaches used;
(5) The nature and strength of interdisciplinary relations established and the dependence of the progress and evolution of interdisciplinary approaches.

Self-Assessment Questions (SAQs) for study session 7

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 7.1 (Testing Learning Outcomes 7.1)
Explain the Information Science and Communication Arts

SAQ 7.2 (Testing Learning Outcomes 7.2)
Explain the relationship between Information Science and Library Science

SAQ 7.3 (Testing Learning Outcomes 7.3)
Discuss the significant differences in several critical respects.

References

Auster, E. and Choo, C (Eds.) (2006). Managing Information for the Competitive Edge. New York: Neal-Schuman.

Ruben, B.D. (2002). The Communication-Information Relationship in System-theoretic Perspective. Journal of the American Society for Information Science, 43(1).

Saracevic, T (2009). Information Science. Journal of the American Society for Information Science, 50 (12).

Study Session 8: Information Science and other Disciplines 1

Expected duration: 1 week or 2 contact hours

Introduction

Although the discussion thus far has highlighted the links between information science and communication arts, computer science, and library science, the discipline (Information Science) also borrows, and integrates and/or applies knowledge from many other disciplines, both directly, and indirectly through the three sister disciplines (computer science, library science, communication arts).

Learning Outcomes for Study Session 8

At the end of this study session, you should be able to:
8.1 Discuss Information science and the Economics

8.1 Information Science and Economics

Economics deals with human behaviour in relation to limited and scarce recourses. It is related to Information Science in the following ways:

Economics of information: This is an aspect of Information Science that is concerned with the pricing and marketing of information, cost-benefit analysis in relation to information, etc.
Marketing of information products and services: The principles of economics assist us in the marketing of information products and services. In particular, the principles of demand and supply are applicable here. Economic indices are used in determining the value of these products and services.
Information Science and Education: Information Science is related to Education as a discipline because of the substantial overlap between the processes of educating and informing people, especially when one views education as the activity of passing on to others previously accumulated personal or social knowledge.
Information Science and Linguistics: Linguistics is the systematic study of human language at four levels.

In-Text Question

_____is an aspect of information science that is concerned with the pricing and marketing of information

A. Economics of information
B. Information Science

C. Information Science and Linguistics
D. Education as a Discipline

In-Text Answer
Option

Information Science borrows from linguistics because the creation, communication and use of information invariably involve the use of language symbols and rules. Language is also used in representing and classifying items. Linguistics deals with the study of human language as a system for communication whereas Information Science is concerned with the communication of information which language is the primary medium.

In indexing and abstracting, linguistic concepts are borrowed in that you have to follow the rules guiding languages syntactic and semantic rules. Abstracting is done with the help of a Thesaurus, which originates from the knowledge of linguistics. In thesaurus construction, linguistics concepts are used. A thesaurus looks more or less like a dictionary but in its own case, similar terms are grouped together. It is in this area that semantics principles in linguistics are useful.

In-Text Question
Language is also used in representing and classifying items. **True/False**

In-Text Answer
True

Information Science is indirectly related to linguistics in the areas of Speech Recognition and Natural Language Processing where the computer is used in analyzing human language.
Speech Recognition and Natural language Processing Systems are tremendously complex pieces of software. Speech Recognition works by disassembling sound into atomic units and then piecing them back (into words) together, while Natural Language Processing (NLP) attempts to translate words into ideas by examining context, patterns, phrases, etc.

Speech recognition works by breaking down sounds the hardware "hears" into smaller, non-divisible sounds called phonemes. Phonemes are distinct, atomic units of sound. For example, the word "those" is made up of three phonemes: the first is the "th" sound, the second is the hard "O" sound, and the final phoneme is the "S" sound**.**

In-Text Question
Information Science is indirectly related to linguistics in the areas of _____and
_____

A. Recognition and Software
B. Natural Language Processing and Speech Recognition
C. Atomic and Structure
D. Economic and Information

In-Text Answer
Option B

A series of phonemes make up syllables; syllables make up words, and words make up sentences, which in turn represent ideas and commands. When the Speech Recognition software has broken sounds into phonemes and syllables, a "best guess" algorithm is used to map the phonemes and syllables to actual words.

Once the Speech Recognition software translates sound into words, Natural language processing software takes over. NLP software parses (parses = to break down into components) into logical units based on context, speech patterns and more "best guess" algorithms.

These logical units of speech are then parsed and analyzed, and finally translated into actual commands the computer can understand, based on the same principles used to generate logical units. Machine translation is another area of indirect application of linguistic concepts in Information Science. Here, computer software developed by linguists is used in translating documents from one language to another.

In-Text Question
_____ is another area of indirect application of linguistic concepts in Information Science.

A. Speech Recognition
B. Natural language processing
C. Machine translation
D. Computer software

In-Text Answer
Option C

8.1.1 Information Science and Management Science

Management science is in itself a synthesis of many other disciplines because it comprises economics, psychology, business management, banking and finance, etc. The

principles of management such as organizing, controlling, monitoring, directing and planning are relevant to management information systems of all types.

Its contribution is noticeable in the area of Management of Information Resource Centres and Information Resources Management (IRM). As an information scientist, one is not only expected to acquire knowledge in areas like information systems, telecommunication and electronic networking and programming but also to excel in any managerial position in public or private practices.

In-Text Question

All this are the discipline of management science except_____

A. Psychology
B. Business management,
C. Banking and finance
D. Geography Science

In-Text Question

Option D

Summary for Study Session 8

In this study session you have learnt the following: We have identified the relationships of Information Science to economics, education, linguistics, and management sciences. It is interesting that Information Science has very strong but indirect linkage to linguistics in particular because of the continued utilization of computer has a power tool in Information Science research.

Self-Assessment Questions (SAQs) for study session 8

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 8.1 (Testing Learning Outcomes 8.1)

a. What is the relationship between Information Science and Education?
b. What do you understand by the economics of information?

Notes on Self-Assessment-Questions for Study Session 9

Information Science and Education: Information Science is related to Education as a discipline because of the substantial overlap between the processes of educating and

informing people, especially when one views education as the activity of passing on to others previously accumulated personal or social knowledge.

Economics of information: This is an aspect of Information Science that is concerned with the pricing and marketing of information, cost-benefit analysis in relation to information, etc.

Marketing of information products and services:

The principles of economics assist us in the marketing of information products and services. In particular, the principles of demand and supply are applicable here. Economic indices are used in determining the value of these products and services.

References

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Study Session 9:

Expected duration: 1 week or 2 contact hours

Relationship of Information Science to Other Disciplines 2

Introduction

In this session, we shall continue our discussion of the relationship of Information Science to other disciplines. It should be noted that while Information Science is directly related to these disciplines in a few cases, it is indirectly related in other cases as a result of the commonality of scientific tools or basic research.

Learning Outcomes for Study Session 9

At the end of this study session, you should be able to:
9.1 Information Science and Engineering

9.1 Information Science and Engineering

Engineering deals with the design of machines for the benefit of mankind. It is also concerned with the design of computer telecommunication equipment useful in Information Science research. This is the basis for convergence of Information and Telecommunication technologies to form what is referred to as ICT (Information and Communication Technologies). ICT is broken down into 3 major groups:

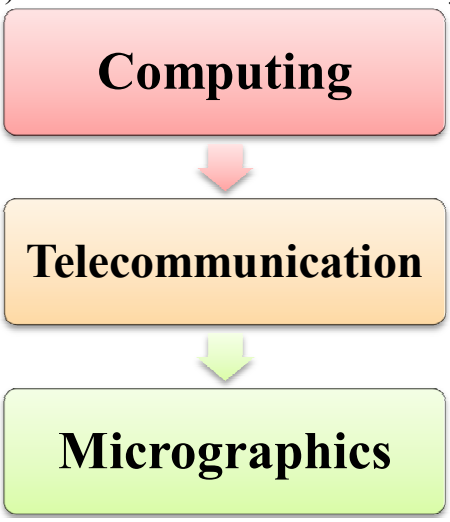

Figure 9.1: *ICT Majors Group*

- Computing: This produces facility or the basis for processing, storage and retrieval of information.
- Telecommunication: This serves as a vehicle through which information, which is already processed/refined, is disseminated to appropriate audience. A very good example is networking or computer interconnection.
- Micrographics: it sees to the quality display of information through the video display unit. This is also an aspect of engineering which interfaces with Information Science(Information presentation).

In-Text Question

The following are the branches of information of sciences and engineering except_____

A. Computing
B. Micrographics
C. Telecommunication
D. Administration

In-Text Answer

Option D

9.1.1 Information Science and Physics

Physics is the study of energy in relation to matter. Energy is the capacity of doing work while matter is anything that has mass and occupies space.

In the area of designing the computer, which is a tool in the management of information resources, physicists carry out the basic research while electronic engineers build on it.

Basic researches in physics led to the manufacture of technologies used in Information Science teaching and research.

In-Text Question

_____refers to the capacity of doing work while matter is anything that has mass and occupies space

A. Energy
B. Waves
C. Atom
D. Mass

In-Text Answer

Option A

9.1.2 Information Science and Mathematics

Mathematics is the scientific study of facts, figures and numbers. Its relationships to information science are in the following areas**:**

- Binary features used in computer developed from mathematics
- Information Science is also related to mathematics in the area of measurements. An aspect of Information Science called Informatics deals with the measurements of information
- Simulation of information systems involves modeling, e.g. statistical probability and mathematical modeling.

9.1.3 Information Science and Statistics

Statistics deals with methods of data collection, analysis of the data and drawing of inferences. It is related to Information Science in the following ways:

- Statistics is useful in the area of data collection and analysis of the data.
- Statistics is also useful in the modeling of information systems such as experts systems, management information systems, artificial intelligent systems, and information retrieval systems. Before any of these systems could be developed, it usually involves statistical models on which the new information system to be developed will be based.

In-Text Question

The type of information sciences that deals with methods of data collection, analysis of the data and drawing of inferences is called _____

A. Mathematics
B. Statistic
C. Economics
D. Philosophy

In-Text Answer

Option B

9.1.4 Information Science and Psychology

Psychology deals with the scientific study of human behaviour. Psychologists study people's needs and wants. The relationships between the discipline and Information Science are as follows**:**

- Information needs of human beings have to be studied which enable one to determine what type of user education to give to people. Furthermore, behavioural studies help in the development of information systems, which should be designed to suit user's needs, perception, attitude and behaviour.
- In the design of information systems, it is necessary to consider the psychological aspects of the interface between the users and the system.
- In Information Science research, like most other researches, collection of data often requires an understudy attitude of the respondents, so the psychologist's expectation in this study of human behaviour serves better in this area.

In-Text Question

Psychologists study people's needs and wants. **True/False**

In-Text Answer

True

9.1.5 Information Science and Philosophy

Philosophy is the study of reasoning. It deals with the pursuit of wisdom and knowledge and could equally be defined as the study of principles underlining knowledge in any discipline, i.e., how we understand and reason things out. Philosophy is related to Information Science in the following ways:

- Information Science is interested in the logic aspect of philosophy, i.e. the use of logic in Information Science. When combined with mathematics, logic allows the development of models, and most models in information retrieval systems are based on the knowledge of logic.
- Development of inquiry systems such as expert systems, artificial intelligence and robotics are based on certain principles and rules of philosophy.

In-Text Question

_____ refer to the study of reasoning

E. Mathematics
F. Statistic
G. Economics
H. Philosophy

In-Test Answer

Option D

Summary for Study Session 9

In this study session, you have learnt the following:

We have further identified the relationships of Information Science to engineering, physics, mathematics, statistics, psychology, and philosophy. Information Science is related to the first two disciplines largely as a result of scientific tools and basic researches inherent in these disciplines while it shares theoretical aspects of interest with the remaining four disciplines.

Self-Assessment Questions (SAQs) for study session 9

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support

Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 9.1 (Testing Learning Outcomes 9.1)

What is the relationship of Information Science to philosophy?
What is the relationship of Information Science to psychology?
What is the relationship of Information Science to mathematics?
Explain how Information Science is related to statistics.

Notes on Self-Assessment-Questions for Study Session 9

Philosophy is the study of reasoning. It deals with the pursuit of wisdom and knowledge and could equally be defined as the study of principles underlining knowledge in any discipline, i.e., how we understand and reason things out. Philosophy is related to Information Science in the following ways:

- Information Science is interested in the logic aspect of philosophy, i.e. the use of logic in Information Science. When combined with mathematics, logic allows the development of models, and most models in information retrieval systems are based on the knowledge of logic.
- Development of inquiry systems such as expert systems, artificial intelligence and robotics are based on certain principles and rules of philosophy.

Psychology deals with the scientific study of human behaviour. Psychologists study people's needs and wants. The relationships between the discipline and Information Science are as follows**:**

- Information needs of human beings have to be studied which enable one to determine what type of user education to give to people.
- In the design of information systems, it is necessary to consider the psychological aspects of the interface between the users and the system.

Mathematics is the scientific study of facts, figures and numbers. Its relationships to information science are in the following areas**:**

- Binary features used in computer developed from mathematics
- Information Science is also related to mathematics in the area of measurements. An aspect of Information Science called Informatics deals with the measurements of information

Statistics deals with methods of data collection, analysis of the data and drawing of inferences. It is related to Information Science in the following ways:

- Statistics is useful in the area of data collection and analysis of the data.

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Study Session 10: Appropriate Curriculum for Information Science

Expected duration: 1 week or 2 contact hours

Introduction

In the preceding lectures, we highlighted the disciplinary focus of Information Science in relation to other disciplines. In particular, the older and well-established disciplines of communication arts, computer science and library science have respectively focused mostly on human, machine, and documentary aspects of information processes.

Information Science seeks a generalized middle-road approach, which poses significant problems for curriculum designers. In the present lecture, we will highlight problems and options in defining an appropriate curriculum for the discipline.

Learning Outcomes for Study Session 10

At the end of this study session, you should be able to:

10.1 Discuss the multidisciplinary nature of Information Science

10.2 Explain the Organization of the Discipline

10.1 Multi-disciplinary Nature of Information Science on its Curriculum

There are three potential traps that curriculum designers of Information Science must watch. Firstly, the danger of focusing on course content that is too generalized and abstract or superficial to be socially or professionally relevant. Secondly, there is the danger of being biased in favour of information in a specific context (e.g. information in paper-based documents).

Lastly, in an attempt to avoid the second trap, there is the danger of trying to cover a very wide terrain comprising the specialized areas of communication arts, computer science and library science.

In other words, the problem of the curriculum designers is how to be adequately generalized and also adequately professionally relevant within the limited time frame of a formal training programme in Information Science.

The relative merits of the following different approaches to curriculum design might be considered:

- Constitute Information Science as an amalgamation of specialized courses in library science, computer science, or communication arts. The drawback of this approach is that the required synthesis of generalized principles of information creation, communication

and use would not be explicitly taught. More seriously, Information Science would have lost its claim to an independent body of knowledge.

- Design independent and generalized Information Science courses that impact general knowledge of information processes. However, for effectiveness, such knowledge would have to be illustrated with context-dependent examples from the library, computer and communication arts and professions in balanced proportions.
- Adopt hybrid approach, that is, a mixture of specialized courses under (a) and the generalized courses under (b).

In-Text Question

Curriculum designers of Information Science must watch how many potential traps

A. Three
B. Two
C. Four
D. Ten

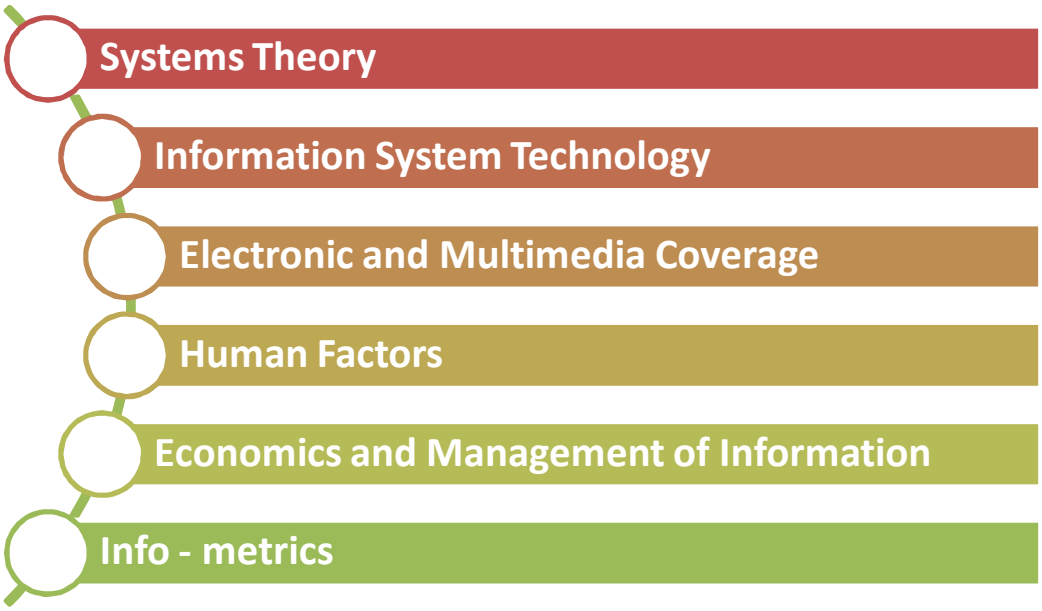
In-Text Answer

Option A

This approach involves constituting a minimal core of generalized Information Science courses, to which would be added selective courses in library science, computer science, and communication arts. Adopt an extensive curriculum comprising of courses under the hybrid approach, as well as selective courses in other Information Science related disciplines-linguistics, philosophy, numerical/ logical science, sociology, psychology, economics, management, etc.

10.2 Organization of the Discipline

Information Science is multi-disciplinary, that is, several disciplines contribute their quota to its disciplinary focus. In spite of this, the discipline can still be organized along the following areas:



Systems Theory: Here, we look at specific systems, e.g. retrieval systems, information systems. More specifically, we look at issues relating to developing of systems. Embedded in the systems theory is the ***Input---Process---Output*** concept, which is found in most systems whether manual or automated. These systems' ideas are applied in all Information Science related systems. These include retrieval systems, artificial intelligence systems, robotics, experts systems, etc. In the systems theory, Information Science carries out in-depth system analysis, design and evaluation in the processes of developing relevant information systems.

Since systems (whether manual or computerized) are prone to having faults and problems, a series of systems checks, trouble shooting and evaluations are carried out regularly. Findings from such evaluation and checks are ploughed back into the systems development cycle for the design of a new workable system**.**

In-Text Question

The following are examples of information sciences except_____

A. Computer based systems
B. Artificial intelligence systems
C. Robotics
D. Experts systems

In-Text Answer

Option A

Information System Technology
In this domain, we look at technology that aids data collection, storage, dissemination and processing of data collected, i.e. the principles/technologies that aid the above processes. This requires a combination of both hard-ware and software technologies.

Electronic and Multimedia Coverage
The issues here include**:** designs of web page, building multimedia application, i.e. integration of the different forms of information into a single unit containing audio, text, video, picture, graphics and figures.

Human Factors
Users are the ultimate targets of information services and products. Therefore, knowing the needs and preferences of users is of utmost importance in information service design and provision. The understanding of individual differences has necessitated "selective dissemination of information" (SDI), which targets specific users' needs.

Information needs and information-seeking behaviour are another aspect of human factors vital to Information Science. Ergonomics is another aspect- it deals with human-machine interactions i.e. the interface between the user and the machine and the effects of the use of IT resources on the end users.

Economics and Management of Information
The management of information resources and economics is a vital aspect of Information Science which relates to development of models, analyses of the economics of information, designing and marketing of information products and services.

Info - metrics
It is the quantitative aspect of Information Science. It is an area where mathematicians and statisticians come into play, e.g. the measurement of information.

In-Text Question
Which of the following is not part of organization discipline?

A. Human Factors
B. Systems Theory
C. Electronic and Multimedia Coverage
D. Statistical Economics

In-Text Answer
Option D

Summary for Study Session 10

In this study session, you have learnt the following:

This session exposed us to the multidisciplinary nature of Information Science, and it has highlighted the implications on the design of its curriculum. Essentially, there are about four basic approaches to the design of Information Science curriculum, each having its merits and demerits and guided by the multidisciplinary nature of the discipline. The lecture further highlighted the organization of Information Science discipline.

Self-Assessment Questions (SAQs) for study session 10

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 10.1 (Testing Learning Outcomes 10.1)

What is the most related discipline to Information Science, and why?

What do you understand by the multi-disciplinary nature of a discipline?

Identify three potential traps that designers of Information Science curriculum should watch out for.

SAQ 10.2 (Testing Learning Outcomes 10.2)

Which of the four basic approaches to the design of Information Science curriculum do you consider as the most appropriate?

Notes on Self-Assessment-Questions for Study Session 10

SAQ 10.1

Multi-disciplinary nature of a discipline explains the problem of the curriculum designers is how to be adequately generalized and also adequately professionally relevant within the limited time frame of a formal training programme in Information Science.

There are three potential traps that curriculum designers of Information Science must watch.

- The danger of focusing on course content that is too generalized and abstract or superficial to be socially or professionally relevant.
- There is the danger of being biased in favour of information in a specific context (e.g. information in paper-based documents).
- In an attempt to avoid the second trap, there is the danger of trying to cover a very wide terrain comprising the specialized areas of communication arts, computer science and library science.

SAQ 10.2

Information System Technology

In this domain, we look at technology that aids data collection, storage, dissemination and processing of data collected, i.e. the principles/technologies that aid the above processes. This requires a combination of both hard-ware and software technologies.

Electronic and Multimedia Coverage

The issues here include**:** designs of web page, building multimedia application, i.e. integration of the different forms of information into a single unit containing audio, text, video, picture, graphics and figures.

Human Factors

Users are the ultimate targets of information services and products. Therefore, knowing the needs and preferences of users is of utmost importance in information service design and provision. The understanding of individual differences has necessitated "selective dissemination of information" (SDI), which targets specific users' needs.

Economics and Management of Information

The management of information resources and economics is a vital aspect of Information Science which relates to development of models, analyses of the economics of information, designing and marketing of information products and services.

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Study session 11:

Expected duration: 1 week or 2 contact hours

The Information Profession

Introduction

Anybody who plays a role in the collection, processing, storage, retrieval and dissemination of information belongs to the information profession. This definition covers the computer scientists, information scientists, journalists, news reporters, news editors, linguists, advertisers, etc.

In this study session you will be introduced to the problems associated with the training of Information Scientists in Africa and approaches to the training of Information Scientists in Africa

Learning Outcomes for study session 11

At the end of this study session, you should be able to:

11.1 Explain the problems associated with the training of Information Scientists in Africa

11.2 Discuss approaches to the training of Information Scientists in Africa

11.1 Problems associated with the training of Information Scientists in Africa

A. The Profession

Generally, before any profession could be recognized and accepted globally, the following criteria must be satisfied:

Figure11.1: *Profession criteria recognized and accepted globally*

Considering the above criteria, it is pertinent to ask: do we really have an Information Science profession in Africa? This seems not to be true because there is no clearly defined body of knowledge (we borrow from other disciplines), no recognized association and there is no public recognition of the profession as such. Nevertheless, the Information Science profession is fast emerging as a recognized discipline on the African content.

In-Text Question

The following are the profession criteria recognized and accepted globally except

a) Provision of recognized professional training

b) A clearly defined body of knowledge

c) Information Managers

d) Existence of an association for the development and control of the profession

In-Text Answer

c) Information Managers

B. Categories of Information Professionals

The categories of information professionals could be tailored along the following lines (below). You should note that there is no water-tight situation which separates one category from the other.

1. Information System Analyst/Designer

2 .Information Managers

3 Information Intermediaries
4. Information Analysts
5. Information Technologists
6. Information Educators
7. Information Researchers
8. Information Brokers/Consultants

In-Text Question
In the categories of information professionals, y ou should note that there is no water-tight situation which separates one category from the other. TRUE/FALSE

In-Txt Answer
TRUE

1. Information System Analyst/Designer: They analyse the problems, whether manual or computerized, and proffer solutions by designing a new system. They are also called database designers, system managers, and information system officers. They are found in many corporations, banks, publishing houses, Oil Corporation, etc.
2 Information Managers: They plan, develop and control information systems as well as the human and material resources needed for their operations and processes. They know the types of information needed; how it can be sourced and they control the human resources needed in the process.
3 Information Intermediaries: These are information professionals who serve as a link between the sources of information and the users of information. They know and have access to these sources. They are called reference librarians, database searchers, etc. They perform some, if not all functions of information brokers but more of referral services.
4. Information Analysts: They analyze information contents. They are called indexers, abstractors (provide abstracts to documents), cataloguers, bibliographers, and translators. They can be found in organizations especially publishing houses where they produce indexes/abstracts to books, and they equally translate documents.
5. Information Technologists: They operate, maintain and control information systems. They are into the hardware aspects. Those best suited in the area are mostly professionals with a background in electronic or electrical engineering.
6. Information Educators: Information educators, also called information-training specialists were a common feature in organizations in the early years of computer introduction to the work place. They educate professionals and non-professionals. They are found in the universities, polytechnics, private organizations and corporate bodies-providing orientations and short courses for users.
7. Information Researchers: They investigate theoretical issues in the discipline. They produce user's studies, field survey, feasibility studies, market research, operational research, etc. They are always found in the universities, research centers/institutes and attached to information services providers.

8. Information Brokers/Consultants: In the developed countries, information brokers are very promising. They provide information for people for a fee. Their range of services includes: Alerting services

- SDI (Selective Dissemination of Information)
- Current awareness
- Information bureau service and
- Referral services

In-Text Question

_____ **Information Intermediaries** are information professionals who serve as a link between the sources of information and the users of information.

a) Information Researchers
b) Information Intermediaries
c) Information Brokers/Consultants
d) Information Analysts

In-Text Answer

b) Information Intermediaries

Web Page Designer (Authors & Editors)

These are specialists in writing and designing web pages. Their specialty is in the area of electronic publishing. They are also very vast in all the rudiments surrounding internet connectivity, CD ROM publishing as well as activities bothering on electronic CD or dissemination of information.

11.2 Approaches to the training of Information Scientists in Africa

Training of individuals is one of the direct strategies to promote the informal sector which provides employment to the bulk of the urban population and is second only to smallholder agriculture as a rural employer.

Summary of study session 11

1.Generally, before any profession could be recognized and accepted globally, the following criteria below must be satisfied

i. A clearly defined body of knowledge
ii. Provision of recognized professional training
iii. Existence of an association for the development and control of the profession.
iv. Public recognition of the professional nature of such a profession.

2. Information System Analyst/Designer analyse the problems, whether manual or computerized, and proffer solutions by designing a new system.

3. Information Managers plan, develop and control information systems as well as the human and material resources needed for their operations and processes.
4. Information Intermediaries these are information professionals who serve as a link between the sources of information and the users of information.
5. Training of individuals is one of the direct strategies to promote the informal sector which provides employment to the bulk of the urban population and is second only to smallholder agriculture as a rural employer.

Self-Assessment Questions (SAQs) for Study Session 11

Now, that you have completed this study session, you can assess how well you have achieved its learning outcomes by answering the following questions. Write your answers in your study diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this study session.

SAQ 11.1 (Testing Learning Outcome 11.1)

1. Before any profession could be recognized and accepted globally, some criteria must be satisfied, highlight those criteria
2. There are several categories of information professionals, enumerate and explain any two

SAQ 11.2 (Testing Learning Outcome 11.2)

Briefly explain the approaches to the training of information scientists in Africa

Notes on SAQS For study session 11

SAQ 11.1

1. The criteria that must be satisfied are

i. A clearly defined body of knowledge
ii. Provision of recognized professional training
iii. Existence of an association for the development and control of the profession.
iv. Public recognition of the professional nature of such a profession.

2. Categories of information professionals are

i. Information System Analyst/Designer
ii. Information Managers

1. Information System Analyst/Designer: They analyse the problems, whether manual or computerized, and proffer solutions by designing a new system. They are also called database designers, system managers, and information system officers. They are found in many corporations, banks, publishing houses, Oil Corporation, etc.

2 Information Managers: They plan, develop and control information systems as well as the human and material resources needed for their operations and processes. They

know the types of information needed; how it can be sourced and they control the human resources needed in the process.

SAQ 11.2

Training of individuals is one of the direct strategies to promote the informal sector which provides employment to the bulk of the urban population and is second only to smallholder agriculture as a rural employer.

References

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Study Session 12: The Education and Survival Skills of Information Professionals in the Information Industry

Expected duration: 1 week or 2 contact hours

Introduction

The problem of educating information professionals is multidimensional and particularly more complicated in Africa. This is largely due to the diversity and dynamism of information, systems, services and products worldwide, and the contrasting situations of the information-sophisticated people in the urban areas and the masses of illiterates in the rural areas across the developing countries.

In this study session, you will be introduced to the education of information professionals in the information industry, alternative approaches to the training of information professionals and the required skills for the survival of information professionals in the information industry.

Learning Outcomes for study session 12

At the end of this study session, you should be to:

12.1 Explain the Education of Information Professionals in the Information Industry

12.2 Discuss alternative approaches to the training of information professionals.

12.3 Highlight the required skills for the survival of information professionals in the information industry

12.1 The Education of Information Professionals in the Information Industry

The problem of educating information professionals for the modern information industry is complicated. This is not only due to the diversity and dynamism of information systems, services and products but also owing to the diversity of the organizational and subject or sectorial contexts, within which the systems, services and products may be created, produced or used.

Hence, not only must information professionals be trained in the generic information skills, they must also know or be willing to learn the specific contexts within which the generic skills are to be used.

Moreover, because of the growing convergence and networking of information technologies, systems and professions, information professionals are constantly coming into contact with other professionals with different training and backgrounds, and are being expected to at least understand and appreciate the perspectives of those other professionals.

In other words, the modern information professional is expected to become multi- than uni-disciplinary oriented, multi- than single-skilled and versatile than rigid in disposition.

For instance, computer science is usually classified as basic science but the modern computer science curriculum now includes a growing number of courses that examine the social, psychological and other behavioural dimensions of computing.

In-Text Question
The problem of educating information professionals for the modern information industry is complicated. This is not only due to the diversity and dynamism of information systems, services and products but also owing to the diversity of the organizational and subject or sectorial contexts, within which the systems, services and products may be created, produced or used. TRUE/FALSE

In-Text Answer
TRUE
Similarly, modern librarianship is no longer restricted to providing information services from paper-based sources but increasingly from various types of electronic sources. Communication artists must also understand the basic features and capabilities of modern communication technologies in order to effectively exploit such technologies in their work.
Pemberton and Nugent (1995) noted recently that economic, technological and higher education trends are now demanding a convergent, amalgamated or integrated education for information curriculum that synthesizes the erstwhile separate bodies of knowledge and techniques in other disciplines.
The same view is expressed by Mokhtari (1994) who noted that as far back as the mid-1970s, the harmonization of the education and training of librarians, document lists, archivists, and information scientists was being discussed at UNESCO and others.

Figure 12.1: *Mokhtari (1994)*
Source: *https://media.licdn.com/mpr/mpr/shrinknp_400_400/p/7/000/288/35b/274e3bc.jpg*

Ogundipe (1994) noted that for developing countries, there is the problem of how to implement curricula for producing information professionals who can serve not only the information-sophisticated people in universities, colleges and modern organizations in urban areas, but also the masses of illiterates in rural areas.

Figure 12.2: *Ogundipe (1994)*
Source:*http://res.cloudinary.com/lbresearch/image/upload/w_960,c_fill,g_face/v1438941124/photo_boo2_77115_1052.jpg*

One problem that usually crops up is that the information professional must often understand a particular context or sector very well before he can productively apply any of the generic skills.
Hence the question that often arises is whether specific subject knowledge, such as agriculture, medicine, economics or banking should be acquired by information professionals prior to, during or after training in various information processing skills. There is no agreement on the most effective approach.

12.2 Alternative approaches to the training of information professionals

Among the alternative approaches to the training of information professionals that are often suggested or implemented are the following:
1. Post-secondary level training (up to sub-degree diploma, bachelor's degree or postgraduate degree or diploma) in any of the specialist or generalist information professions (computer science, communication arts, library science, archival and records management, information science, etc.), followed by on-the- job training in the intricacies of a specific socio-economic sector such as agriculture, education, health or banking.
2. Training in a particular discipline, say agriculture or health, up to a reasonably high level (say first degree level), followed by a postgraduate degree or diploma in any of the specialist or generalist information professions. It should be noted here that the Master of Information Science programme at the Africa Regional Centre for Information Science (ARCIS), University of Ibadan follows this approach.
3. Some sort of combined honours or concurrent training at the post-secondary level (bachelor's degree or national diploma) in both information and non-

information subjects towards preparing graduates in both the generic information processing skills and the disciplinary knowledge for which the degree or diploma is awarded.

In-Text Question
Among the alternative approaches to the training of information professionals that are often suggested or implemented is _____

In-Text Answer
Training in a particular discipline

This has been a growing trend in degree programmes where students are expected to master such information processing skills as research methods, statistical analysis, communication skills, information search skills, problem-solving and management skills, etc, as part of the curriculum of the programme.

12.3 Professional and Survival Skills of Information Professionals in the Information Industry

The rapid growth, diversity and obsolescence of information systems, services, products and technologies imply that various skills would be demanded by the information industry not only those of the information professionals but all of us who must live in our shrinking global village. These skills will be based in the ability to relate properly with information at any stage of its life cycle.
The needed skills would range from those required for appreciating and valuing information, for defining, recording or collecting data; for organizing data for storage; for searching and retrieving information from various sources; for analyzing and interpreting information; for communicating and disseminating information among people over space and time, etc.
Such skills, and some of the corresponding information professionals, may be grouped together under the following broad classes:
1. Investigative and Research Skills
2. Indexing and Classification Skills
3. Communication Skills
4. Information Retrieval Skills
5. Problem-Solving and Management Skills
6. Information Technology and System Development Skills

1. Investigative and Research Skills: These are needed to conduct research for defining, collecting, analyzing and interpreting new or existing data and information (Researchers, Statisticians, Information Scientists)
2. Indexing and Classification Skills: They are needed to summarize, index and systematically organize pieces of information for storage in different media (Indexers,

Cataloguers, Librarians, Data/Database Managers, Record Managers, Archivists, Information Scientists)

3. Communication Skills: They are needed for communicating information through verbal and non-verbal symbols, and to interpret communicated information (Communication Scientists & Professionals, Information Scientists)

4. Information Retrieval Skills: They are needed to search for and retrieve information from different information systems, including computers, libraries, record registries, and the Internet (Archivists, Data/Database Managers, Librarians, Record Managers, and Information Scientists).

5. Problem-Solving and Management Skills: They are needed to use data, information and knowledge to solve human problems(Decision-Makers, Management Consultants, Information Scientists)

6. Information Technology and System Development Skills: They are needed to design efficient manual and automated procedures and technologies for organizing, storing, retrieving, computing, transferring, and using data and information (Computer Scientists, System Analysts, System Designers, Software Developers, Information Scientists, and Information Technologists)

Firstly, note that Information Science is listed against each of the different skills because it is generalist than specialist in scope. Secondly, you must also not lose sight of the merits and limitations of both specialist and generalist disciplines and professions.

Box 12.1: The advantage of a specialist profession
The advantage of a specialist profession is the opportunity for in-depth coverage of its specialty, which must be set against the demerit of partial orientation to information issues and problems.

On the other hand, generalist professions tend to emphasize general principles pertaining to information issues and problems, but often lack in-depth coverage of the different specialist disciplines from which it draws its generalist focus. It is needless to stress that you need both types of profession in the modern information industry.

Summary of study session 12

1. The problem of educating information professionals for the modern information industry is complicated.
2. In other words, the modern information professional is expected to become multi- than unit-disciplinary oriented, multi- than single-skilled and versatile than rigid in disposition.
3. One problem that usually crops up is that the information professional must often understand a particular context or sector very well before he can productively apply any of the generic skills.
4. Post-secondary level training (up to sub-degree diploma, bachelor's degree or postgraduate degree or diploma) in any of the specialist or generalist

information professions (computer science, communication arts, library science, archival and records management, information science, etc.)
5. Training in a particular discipline, say agriculture or health, up to a reasonably high level (say first degree level), followed by a postgraduate degree or diploma in any of the specialist or generalist information professions.

Self-Assessment Questions (SAQs) for Study Session 12

Now, that you have completed this study session, you can assess how well you have achieved its learning outcomes by answering the following questions. Write your answers in your study diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this study session.

SAQ 12.1 (Testing Learning Outcome 12.1)
What are the problems associated with the training of information professionals in Africa?

SAQ 12.2 (Testing Learning Outcome 12.2)
Explain any one of the alternative approaches to the training of information professionals that are often suggested or implemented

SAQ 12.3 (Test Learning Outcome 12.3)
Highlight the professional skills required for information professionals in Africa then explain any two

Notes on SAQS For study session 12

SAQ 12.1

Ogundipe (1994) noted that for developing countries, there is the problem of how to implement curricula for producing information professionals who can serve not only the information-sophisticated people in universities, colleges and modern organizations in urban areas, but also the masses of illiterates in rural areas.
Another one problem that usually crops up is that the information professional must often understand a particular context or sector very well before he can productively apply any of the generic skills.
Hence the question that often arises is whether specific subject knowledge, such as agriculture, medicine, economics or banking should be acquired by information professionals prior to, during or after training in various information processing skills. There is no agreement on the most effective approach.

SAQ 12.2

Training in a particular discipline, say agriculture or health, up to a reasonably high level (say first degree level), followed by a postgraduate degree or diploma in any of the

specialist or generalist information professions. It should be noted here that the Master of Information Science programme at the Africa Regional Centre for Information Science (ARCIS), University of Ibadan follows this approach.

SAQ 12.3

The professional skills required for information professionals in Africa are:

1. Investigative and Research Skills
2. Indexing and Classification Skills
3. Communication Skills
4. Information Retrieval Skills
5. Problem-Solving and Management Skills
6. Information Technology and System Development Skills

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Study Session 13: Ethics and Moral issues in Information Science

Expected duration: 1 week or 2 contact hours

Introduction

Ethics are a kind of code of conduct/guide of any profession. Thus, in Information Science, ethical practices could be defined as the moral standards that guide behaviours and actions of researchers and professionals in the discipline.

In this study session, you will be learned Ethics in Information Science research and Ethics in the teaching of Information Science

Learning Outcomes for study session 13

At the end of this study session, you should be able to:

13.1 Explain the Ethics in Information Science research

13.2 Discuss the Ethics in the teaching of Information Science

13.1 Ethics in Information Science Research

There are three main forms of ethics in information science research which are listed in the diagram below

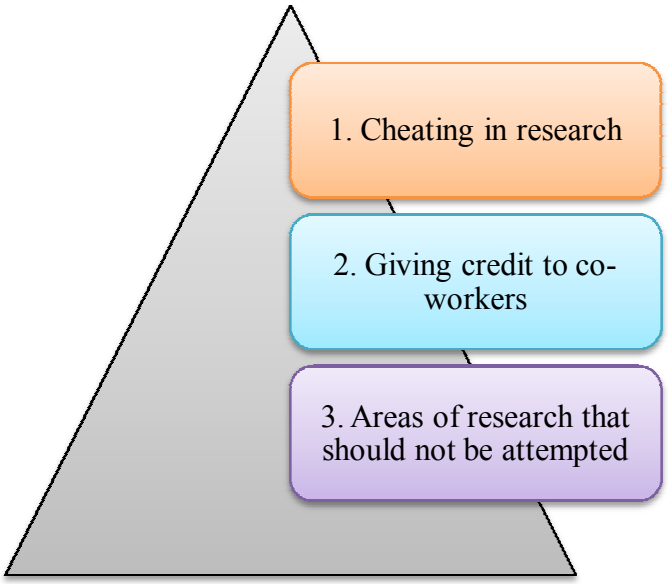

Figure 13.1: *Forms of ethics in information science research*

1. Cheating in research: In the field of Information Science, cheating is much less likely to occur than say, in biological and physical sciences. For one thing, Information Science may not be as afflicted by the 'publish or perish' syndrome (or the related 'be cited or perish' syndrome) as some of the core sciences have been.

This is partly because there are simply fewer academics and researchers in Information Science, but also because the discipline has a much narrower research base than the physical sciences. Thus, publications based on research findings are relatively few.

Furthermore, the theoretical foundations of Information Science are not well developed and what theories that might have appeared were largely borrowed from other disciplines.

Clearly, intellectual dishonesty is not productive in the long term; it leads researchers up false paths and thereby hinders the development of the theoretical basis of the sciences. Furthermore at the individual level it impairs career prospects!

2 Giving credit to co-workers: A related problem to "cheating" in Information Science research is the problem of publications resulting from a piece of work involving senior and junior authors. There are two ethical questions here: First, should a worthwhile piece of completed research be published by the student or the supervisor?

It is argued that a student has the first option to publish his research study and he is not obligated to enlist the supervisor as co-author but he must at least acknowledge his contribution. However, if the student does not wish to publish, then after some time, the supervisor has the right to publish the work but he must inform the student and enlist him as a co-author of the published article.

The second question concerns the acknowledgement in an article which is published. Acknowledgement of the co-operation of co-workers, regardless of their status is an essential component of the integrity of all types of research. Thus, research articles which are published should give credit to every individual, agencies or organizations that contributed to the successful completion of the study.

In-Text Answer

In the field of Information Science, cheating is much less likely to occur than say, in biological and physical sciences. YES/NO

In-Text Question

YES

3 Areas of research that should not be attempted: It has been argued strongly that there are certain areas of endeavour that Information Science research should not dwell into because of their possible implications. In particular is the concern that the results of research in Information Science should not be transferred into such areas as propaganda, advertising and education in which information is sender-oriented rather than user-oriented.

One other point that should be made about research in Information Science is that a number of studies involve observing information transfer processes in action or involve

questionnaires. In the former case, the researchers should inform whoever he is observing that he is carrying out observations on that person's behaviour.
In the second case, results from the questionnaires should be published only in such a way that responses cannot be identified with particular individuals.

In-Text Question
The following are the forms of ethics in information science research except _____
a) Cheating in research
b) Giving credit to co-workers
c) Bias to information presented
d) Areas of research that should not be attempted

In-Text Answer
c) Bias to information presented

13.2 Ethics in Teaching of Information Science

A lecturer in any subject is in a unique position to influence his or her students by presenting the information in a biased manner. It must also be said that lectures would be dull indeed if the lecturer did not inject some personal asides and commentaries on other people's work.
The above remarks apply to all subjects, of course. Furthermore, because Information Science is so wide-ranging, a teacher has a responsibility to present as total a picture as possible, since withholding information is a form of bias.

13.2.1 Ethics in Information Work

The following below are considered as characteristic of Ethics in Information Work

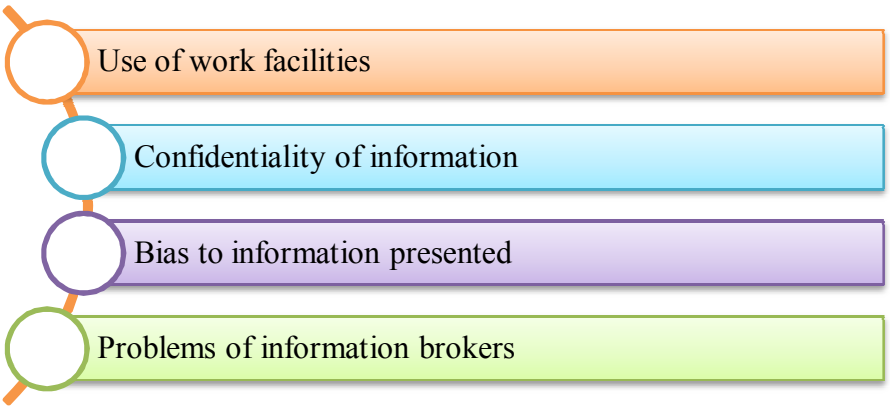

Figure 13.2: *characteristic of Ethics in Information Work*

a) Use of work facilities: Industry suffers considerable losses each year through theft by its employees. In the field of information work, the possibilities for theft are legion. An information scientist could make use of the information retrieval facilities within his

organization to answer queries wanted for personal reasons, or for paid freelance work. Any code of ethics should condemn unauthorized use of work facilities.

b) Confidentiality of information: The inquiries about an organization should always be regarded as confidential by the organization's information officer, that is, it should not be passed on to any third party without the original requestor's permission. Equally, an information officer should not be prepared to answer any request for confidential information which originates from outside the company without permission from someone in authority.

In-Text Question

In _____ industry suffers considerable losses each year through theft by its employees.

a) Confidentiality of information

b) Use of work facilities

c) Bias to information presented

d) Problems of information brokers

In-Text Answer

b) Use of work facilities

c) Bias to information presented: An information scientist may be asked to find information for the sole purpose of 'knocking' a rival firm or one of its products. What if in the course of his search he finds the product isn't that bad, or indeed, his company's product is clearly inferior?

Information scientists should never be asked to employ their expertise to present biased results, and they should always strive to present a balanced picture, irrespective of how uncomfortable such a picture may be for his employers.

d) Problems of information brokers: Consider a case where an information broker is approached independently by two clients for the same information. Two problems arise here.

Firstly, should both clients be charged the full price or should the second client get the report at a reduced price, or should both get the information at reduced price? In both the latter cases, each client might be told that someone else has asked for that piece of information.

Secondly, some clients insert exclusion clauses whereby information supplied by the broker may not be passed on to third parties. Such exclusion clauses could damage the broker's business in that he may have to turn away a potential long-time client.

13.2.2 Information as Power

There can be no question that some individuals have access to a greater amount of information than others. This applies particularly to large corporations, which, by virtue

of their ability to spend money on information are better placed than smaller corporations or individuals.
Furthermore, some people are better able to process and assimilate information than others.

Box 13.1: One implication of the large scale advent of on-line information retrieval

The implication is the possibility that on-line vendors or governments would find it easier to restrict or distort the flow of information to some or all of the public.

Print on paper is widely available in libraries, is easy to reproduce and a government (even the most repressive) would find it difficult to keep track of who is reading what; equally it would find it difficult to control the spread of such documents.
By contrast, computerized systems, being more centralized, allow for the possibility of distorting the information flowing to particular customers. The sophistication of such processes also means that relatively poor members of society will find it harder to access such information or to reproduce it.
One way to reduce these dangers is to develop a profession of information management which will make information and the mechanisms for processing it as widely available as possible. To this end, information scientists should concern themselves not only with technical and economic aspects, but also with political, social and ethical matters.
It is also time information scientists realized that information is not neutral in that it can be abused and distorted. Finally, one particular area that needs to be mentioned is that developing countries have an urgent need of more information in order to raise their standards of living.

In-Text Question
Information scientists should concern themselves not only with technical and economic aspects, but also with _____

In-Text Answer
Political, social and ethical matters

What the developing countries do not need are highly sophisticated computerized systems without the personnel to handle such systems or the R&D effort to make use of them. They have a need for information that has been analysed and digested and is of immediate value to them and in printed from.

13.2.3 Does an information scientist have responsibilities to society?

In the course of his duties, an information scientist may be asked to carry out a search on, say, the safety of a particular effluent from one of his company's factories. He may find that his effluent has many dangers and/or that the amounts being discharged exceed legal limits.
Has the information scientist has any duty to society in such cases? Of course, he has, and indeed should feel obliged to make the results known (by anonymous means if need be)

to the public. Even if the data includes material which is held in confidential company files, there is a public duty which overrides the duty of the employee to his company.
An information scientist has a duty to draw attention of his company or employers to possible consequences of their actions. Honesty and integrity demand that views should be made known and that there should be a mechanism which would allow an information scientist to make his fears known both within his company and within the profession.
They need to realize that the consequences of actions taken by their organizations can, and often do, have far-reaching effects on society at large and it is their duty to be aware of such consequences. Information scientists are in a unique position to do this as they are well used to collecting and evaluating scientific information and to summarizing it in a concise and readable fashion.

In-Text Question

_____ has a duty to draw attention of his company or employers to possible consequences of their actions.

a) An information scientist
b) An information researcher
c) An information analysis
d) All of the answer

In-Text Answer

a) An information scientist

Summary of study session 13

1. There are three main forms of ethics in information science research which are
   i. Cheating in research
   ii. Giving credit to co-workers
   iii. Areas of research that should not be attempted
2. Use of work facilities: Industry suffers considerable losses each year through theft by its employees. In the field of information work, the possibilities for theft are legion.
3. There can be no question that some individuals have access to a greater amount of information than others.
4. An information scientist has a duty to draw attention of his company or employers to possible consequences of their actions.

Self-Assessment Questions (SAQs) for Study Session 12

Now, that you have completed this study session, you can assess how well you have achieved its learning outcomes by answering the following questions. Write your answers in your study diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this study session.

SAQ 13.1 (Testing Learning Outcome 13.1)

Briefly discuss some of the ethics relating to Information Science research.

SAQ 13.2 (Testing Learning Outcome 13.2)

1. Enumerate and explain four characteristic of Ethics in Information Work
2. An information scientist has a duty to draw attention of his company or employers to possible consequences of their actions. Honesty and integrity demand that views should be made known and that there should be a mechanism which would allow an information scientist to make his fears known both within his company and within the profession. TRUE/FALSE

Notes on SAQS For study session 13

SAQ 13.1

The ethics relating to Information Science research are:

i. Cheating in research
ii. Giving credit to co-workers
iii. Areas of research that should not be attempted

1. Cheating in research: In the field of Information Science, cheating is much less likely to occur than say, in biological and physical sciences. For one thing, Information Science may not be as afflicted by the 'publish or perish' syndrome (or the related 'be cited or perish' syndrome) as some of the core sciences have been.

This is partly because there are simply fewer academics and researchers in Information Science, but also because the discipline has a much narrower research base than the physical sciences. Thus, publications based on research findings are relatively few.

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3 Areas of research that should not be attempted: It has been argued strongly that there are certain areas of endeavour that Information Science research should not dwell into because of their possible implications. In particular is the concern that the results of research in Information Science should not be transferred into such areas as propaganda, advertising and education in which information is sender-oriented rather than user-oriented.

One other point that should be made about research in Information Science is that a number of studies involve observing information transfer processes in action or involve questionnaires. In the former case, the researchers should inform whoever he is observing that he is carrying out observations on that person's behaviour.

In the second case, results from the questionnaires should be published only in such a way that responses cannot be identified with particular individuals.

SAQ 13.2

TRUE

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