UNIVERSITI TEKNOLOGI MARA

UITM PUNCAK PERDANA BRANCH

(IMC412)

FUNDAMENTALS OF INFORMATION SCIENCE

INDIVIDUAL ASSIGMENT

PREPARED FOR:

PROFESOR MADYA DR MAD KHIR JOHARI BIN ABDULLAH SANI

PREPARED BY:

NAME	MATRIX NUMBER
MUHAMMAD IQBAL BIN BAHARI	2024699752

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Part 1: Knowledge and Comprehension

1. **Define the following terms**

- Information Science

  Information science is the study of how information is created, organized, stored, retrieved, and used. It aims to understand and manage information effectively. It is a process that helps people and organizations access and use knowledge (Cliff, 2024).

- Data

  Data refers to raw, unprocessed facts or information that can be collected, analyzed, and used to gain insights or decisions. It can come in many forms, such as numbers, text, images, or other measurable elements. Data itself has no meaning until it is processed or organized. Data can be categorized into qualitative and quantitative types (Varun, 2024).

- Information

  Information is data that has been processed and organized to make it meaningful and useful. It helps people understand things, make decisions, and solve problems. The nature of information is organized, purposeful, and contextual. Its value lies in its ability to inform decisions, improve efficiency, and support communication (Mcgonigle & Mastrian, n.d.).

- Knowledge

  Knowledge is information that has been understood, processed, and applied through experience or learning. It goes beyond facts or data to include the ability to use and interpret information in a meaningful way. It is often built over time, evolving with new experiences and skills. Its value lies in its ability to help solve problems, make decisions, and innovate (Bates, 2010).

- Information Retrieval

  Information Retrieval is the process of finding and retrieving information from a collection of data that matches a user's query or need. It involves finding relevant information from large data sets, such as databases, websites, or digital libraries. The goal of Information Retrieval is to help users access the right information quickly and accurately (Hambarde & Proenca, 2023).

2. Short-answer questions

- **What is the difference between "data" and "information"? Provide an example of each.**

  Data is raw, unprocessed facts or figures that have no meaning or context, while Information is data that has been processed, organized or structured in such a way that it becomes meaningful, useful and relevant for decision-making or understanding (Krishen & Petrescu, 2018). For example, the number "20" is just data without context, while "20 is the age of the student" is information because it provides context and meaning.

- **Describe the main components of the information lifecycle.**

  The information lifecycle is the stages of creating or receiving information, storing it securely, using it for various purposes, sharing or distributing it as needed, archiving it for long-term preservation, and finally disposing of it when it is no longer needed. Each stage ensures that information is managed effectively and securely throughout its existence (Runardotter et al., n.d.).

- **Explain how Information Science impacts decision-making processes in organizations.**

  Information Science impacts decision-making in organizations by helping to collect, organize, and analyze data to provide valuable insights. It ensures that decision-makers have access to accurate, relevant, and timely information. It can improve the quality of their choices. By using tools such as databases, data analytics, and information systems, organizations can identify trends, solve problems, and make decisions quickly. This leads to better strategies, increased efficiency, and competitiveness in the marketplace (Yusuf Wanjala et al., 2022).

Part 2: Application

1. **Case Study: Digital Library Design**

   Designing a digital library for a university involves several key steps to ensure that the organization can effectively acquire and disseminate information. First, I will conduct a comprehensive assessment to understand the specific needs of the university's students, faculty, and staff. Next, I will focus on metadata creation, ensuring that each digital object is described with comprehensive and complete metadata to facilitate retrieval (Umesh & Satish, n.d.). Implementing a robust information retrieval system is essential. It combines advanced search functions and user-friendliness to enhance accessibility. In addition, I will ensure connectivity between the library and other digital databases to broaden the scope of available resources (Head, 2016). Regular user feedback will be collected to continuously improve the system and address any emerging issues and needs. Finally, I will establish a clear policy for the long-term preservation and archiving of digital content to maintain the relevance and usability of the library over time.

2. Practical Example: Information Retrieval

I always use Google Scholar to search for articles. For example, I search for articles on "online learning." To ensure an effective search, I use specific keywords such as "online learning," "e-learning," and "distance education." I use filters to narrow down the results to articles published in the last five years and sort them by relevance. This strategy helps me find the most recent and relevant studies. Information Science concepts, such as the use of metadata and advanced search algorithms, have significantly improved my search results. It allows for accurate and efficient retrieval of relevant information. For example, metadata tags help in filtering articles based on publication date and relevance, while search algorithms ensure that the most cited and impactful papers appear at the top of the results (Ho et al., 2016). This approach not only saves time but also ensures that I access high-quality and relevant information for my research.

Part 3: Analysis and Synthesis

1. Analyze the Role of Information Professionals

The roles of librarians, data managers, and information systems analysts are essential to the information lifecycle. They all contribute different skills and competencies that help organizations manage and use information and make decisions.

Librarians have evolved from a traditional role focused on information retrieval to a key role in data management and analysis. They are responsible for collecting, managing, storing, organizing, and analyzing data. Their expertise in organizing large amounts of information makes them well-suited for roles such as data librarians or analytical librarians. They manage data quality and support research initiatives through data preservation and organization (Karno et al., 2023). Key competencies for librarians

are proficiency in data analytics software, strong communication skills to translate complex data findings into actionable insights, and a commitment to continuous learning in emerging technologies.

Data managers play a critical role in the information lifecycle by overseeing the systematic control of data from its creation to its disposal. These professionals ensure data integrity, security, and compliance with regulatory standards throughout its lifecycle. Data managers are responsible for data governance. They establish policies for data handling, ensure data quality, and maintain data privacy and security. They also manage data storage, facilitate data sharing and use, and oversee data archiving and deletion processes (Teal, 2024). Essential skills for data managers include technical proficiency in database management, data warehousing, and data integration tools. They must be adept at data analysis and have strong problem-solving skills to identify and address data-related issues. Knowledge of data governance and compliance is essential. They also need to be able to manage data security and privacy measures. In addition, data managers need strong communication and leadership skills to collaborate effectively with other departments and ensure data strategies align with organizational goals (indeed, 2023). These competencies enable data managers to maintain high data quality and support the strategic use of data within an organization.

Information systems analysts function as a business needs and technology solutions department. They analyze an organization's information systems to identify areas for improvement and implement new technologies that increase efficiency and effectiveness. Their role is to design systems, conduct feasibility studies, and ensure that information systems align with organizational goals. Critical competencies for this role are the ability to solve complex problems, proficiency in programming languages, and a deep understanding of business processes and Information Technology

infrastructure (Wang et al., 2023). Analysts must also have excellent communication skills to interface between technical teams and non-technical stakeholders.

In conclusion, librarians manage information resources and foster a culture of data literacy, data managers ensure sound governance of an organization's data assets, and information systems analysts focus on optimizing technology solutions to achieve business objectives.

2. Synthesize New Ideas

The field of Information Science is poised for significant evolution in response to rapid advances in artificial intelligence (AI) and big data. As these technologies advance, Information Science must adapt by integrating new methodologies and tools that improve data management, analysis, and dissemination. One approach is to incorporate machine learning and deep learning techniques into data analysis workflows. These methods can automate the detection of patterns and anomalies in large data sets, simplifying data processing, and making more efficient decisions. Additionally, the development of natural language processing (NLP) technology can improve information retrieval systems, making it easier for users to access relevant data through conversational interfaces and advanced search capabilities (Almanasra, 2024).

Furthermore, the rise of the Internet of Things (IoT) provides opportunities for Information Science professionals to engage with real-time data streams. Integrating AI with big data not only improves operational efficiency but also raises important considerations regarding data governance and ethical implications, which need to be proactively addressed by professionals in the field (Demigha, 2020). This evolution will likely lead to a greater emphasis on interdisciplinary collaboration. Certain people related to information technology will work together to develop comprehensive solutions that leverage AI capabilities while adhering to ethical standards.

In terms of impact on the profession, these advances require Information Science professionals to acquire new competencies in AI technologies, data analytics tools, and ethical frameworks. Ongoing education and training are essential to keep up with technological changes and ensure practitioners remain effective in their roles (Isaac et al., 2019). As a result, Information Science is poised to transform into a more dynamic field that not only manages information but also actively participates in shaping how organizations leverage AI and big data for strategic advantage.

Part 4: Evaluation

1. **Evaluate the Effectiveness of Open Access**

Open access publishing has emerged in the academic landscape. Its effectiveness can be assessed through a balanced examination of its advantages and disadvantages.

One of the most significant benefits of open access is its ability to gain access to knowledge. By removing paywalls, open access enables broader access to scholarly research, allowing individuals from diverse backgrounds, including those in developing countries, to engage with and use scholarly work without financial barriers. This increased accessibility can improve research and readership. It can also increase collaboration between researchers and the community, which encourages the development of new ideas and innovations (Tennant et al., 2016). Research shows that articles published in Open Access format receive more citations than subscription-based articles. This shows that Open Access can significantly increase the impact and reach of scholarly work (Jabroyd, 2023).

Despite these advantages, Open Access also has its challenges. A key concern is the potential for lower quality control in some Open Access journals. This happens when some predatory journals exploit the Open Access model to publish low-quality research

without rigorous review (Navnihar, 2024). This can affect the credibility of Open Access publications and pose challenges for researchers in distinguishing quality journals from dubious ones. Additionally, while Open Access eliminates costs for readers, it shifts the financial burden to authors through article processing charges (APCs), which can be very expensive for researchers without institutional support. This model raises concerns about equity in publishing, as those with fewer resources may struggle to publish their work in reputable Open Access journals (Keystone, 2023).

In assessing whether open access improves the dissemination of knowledge, it is clear that it facilitates faster and wider distribution of research findings. However, these benefits depend on maintaining high standards of quality and integrity in Open Access publications. The effectiveness of open access depends on addressing these quality concerns and ensuring that finances do not become an issue for publishers. As long as these challenges are met with appropriate measures such as rigorous peer review processes and transparent publishing practices, open access has the potential to significantly improve the dissemination of knowledge across a range of fields, including Information Science.

2. Critique Information Policies

Criticisms of Intellectual Property Rights (IPR) as information policy make the complex interplay between the protection of creators' rights and the wider dissemination of knowledge and innovation. IPR laws, which include copyright, patents and trademarks, are designed to incentivize creativity by granting exclusive rights to creators. However, these protections can indirectly restrict the dissemination of the information they actually want to convey.

One important impact of IPR is the creation of barriers to access for consumers and innovators. For example, excessive protection can lead to monopolistic practices where a few entities control essential knowledge and technology, limiting its availability to the public. This is particularly evident in sectors such as pharmaceuticals, where patents can restrict access to life-saving medicines, making them unaffordable for many in less developed regions. In addition, restrictive copyright laws can stifle creativity and collaboration by imposing heavy restrictions on the use of existing works, which are essential for innovation in areas such as education and technology (Mansell & Steinmueller, 2009).

The tension between protecting intellectual property and facilitating knowledge sharing is increasingly complex. In developed countries, strong IPR protection can foster innovation, however, in developing countries, this same protection can stifle local innovation by hindering access to needed technology and knowledge (Legasis Private Limited, 2022). This difference suggests the need for a more nuanced approach to balancing protection and accessibility.

To improve IPR policy, several changes can be implemented. First, Implementing Flexibility in Copyright Law. For example, introducing provisions that allow for fair use or educational exceptions can help ensure that important information remains accessible while still protecting the rights of creators. In addition, Promoting Open Licensing Models such as Promoting open source licenses and collaborative creativity can facilitate wider sharing of information and resources while still acknowledging the contributions of original creators. Finally, Re-evaluating Patent Term and Scope. Shortening patent terms or limiting the scope of patents can encourage faster diffusion of innovation while still providing adequate incentives for creators.

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