

# **Modern Information Literacy Innovates Library by Systems Thinking**

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## **Abstract**

Information literacy enables library users to well use modern sources of information in order to both create and apply knowledge. This competency can be more or less holistic with the level of holism having crucial consequences. To describe this particular need for holism systems<sup>1</sup> thinking and information literacy are discussed, especially in relation to their creative and innovative use. We propose a Dialectical Systems Theory which can support this endeavor.

**Key words:** dialectical systems theory, information literacy, innovation, librarianship, systems thinking

## Modern Information Literacy Innovates Library by Systems Thinking

### Introduction

An old anecdote demonstrates the link between systems thinking and competency in information literacy. During the cold war, the U.S. trained its spies to scout through the Soviet Union as, of course, the converse was done in the US by the Soviets. Once, a spy parachuted into a Russian village. He entered a local bar to make contacts. People accepted him well, but they did not believe he was Russian, although they all agreed he spoke Russian, danced like a Russian, and drank like a Russian. He knew more or less everything they discussed concerning the Russian situation, lifestyle, and so on. However, their doubts astonished him and he then why they did not believe him. “Russians are very rarely black people,” they answered! Information on which the American action was built in this case was not requisitely holistic. The plan for the spy was built on competence that was too one-sided for the spy to use available information and use it well. The link between information literacy, systems thinking (as the practice of requisitely holistic browsing, observation, perception, thinking, emotional and spiritual life, decision making, and action), and systems theory is our issue in this contribution. Our viewpoint synergizes the perspectives of a librarian and a systems theorist.

### Concerning Requisite Holism

Let us begin by appealing to the Mulej/Kajzer (1998, 129-140) law of requisite holism. See Tables 1 (Mulej, 2007, 352) and 2. One must always decide *which level of holism is good enough* to solve the decision-makers’ dilemma with reasonable effectiveness. This includes avoiding both exaggerations (Tables 1 and 2) while a *middle* option is close enough to reality to fit the situation’s needs and possibilities. This is what Mulej and Kajzer (1998) called *requisite holism*. It is a law: successful persons and organizations (tacitly) live with this law informally or with application of systems theory<sup>2</sup> (Čančer, Mulej, 2006; François, ed., 2004; Mulej et al., 1998; Mulej et al., 2003; Mulej, Ženko, Potočan, 2002; Mulej et al., 2008; Rosi, Mulej, 2006; Udovičič, Mulej, 2006; Wilby, Allen, ed, 2005; Ženko, 1999; Ženko et al, 2002). Information literacy is supposed to help people use the available knowledge and other information with requisite holism rather than with the exaggerations shown in Tables 1 and 2.

Fictitious holism/realism (inside a single viewpoint)	Requisite holism/realism (a dialectical system of essential viewpoints)	Total = real holism/realism (a system of all viewpoints)
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Table 1: The selected level of holism and realism of consideration of the selected topic between the fictitious, requisite, and total holism and realism

APPROACH TO DEALING WITH AN OBJECT AS A TOPIC OF THINKING, ETC.	One-sidedness due to a single viewpoint; e.g., that of a librarian or technician or of a user alone	Requisite holism by co-operation of all essential professionals and only them, librarians included.	Total holism due to consideration of <i>all</i> attributes from <i>all</i> viewpoints, insights from them, and their synergies
TYPE OF APPROACH	Simple (excessively so)	Requisitely simple	Very entangled
TYPE OF SYSTEM	Single-viewpoint-based system	Dialectical system	Total system
ATTRIBUTES OF OBJECT INCLUDED IN SYSTEM	Too few	All essential	All
RESULT OF APPROACH	Fictitious holism (in most cases)	Requisite holism (good in most cases)	Total holism
FOCUS MADE POSSIBLE	Excessively narrow focus (in most cases)	Requisitely holistic focus	Lack of focus
NUMBER OF PROFESSIONS	One	Requisite number	All
TYPE OF WORK	Individual	Mixed team of requisitely different experts	All humankind in co-operation
CONSEQUENCES	Dangerous and complex due to crucial oversights	No problems due to no crucial oversights	Simple due to no oversights
AVAILABILITY	Too frequent in real life	Possible in real life	Not possible in real life

Table 2: Law of requisite holism

### Understanding Information Literacy

Information literacy is often understood as either digital/computer literacy or library instruction. This definition is not sufficiently holistic and causes troubles in practical application. Instead it is necessary to incorporate both sides and then reaching beyond them. Thus, information literacy emphasizes:

- Identification of quality information resources;
- Evaluation of data retrieved in order to extract information from it;
- Effective use of information in order to understand life and reality, create novelties, and generate innovations of benefits to users, e.g., to solve particular problems;
- Sharing of what has otherwise been learned in higher education or elsewhere.

In this perspective, knowledge is understood as explicitly interactive, “Knowledge only arises from the interaction of people in a group, culture, or society. Knowledge is not in us, but between us” (Hays and Wasilewski, 2005: 73). Information literacy supports this viewpoint.

Information literacy matters for students and researchers within any specific discipline and in co-operation among disciplines. We contend that information literacy can enormously improve performance of coworkers and/or students if it is requisitely holistic to meet the library/user’s information needs. This is especially true in our contemporary, innovative society, which is a knowledge-based society using knowledge for routine, creativity, and innovation as a basis of competitiveness and well-being. Indeed, the current generation is entering a historical period in which innovation and “the creative class society” prevails, at least in the advanced countries, to the extent at which the less innovative countries and peoples are practically subordinated as neo-colonies; this includes differences in information literacy’s development.

The creative class became extremely important and large in recent decades; it keeps growing rapidly. Florida (2005) found two basic causes in his field research about the sources for differences in economic prosperity among varied regions in the United States:

1. In the U.S., the creative class grew from 5 percent a century ago to over 30% in 1999 with 12 % in its super creative core, while the working class dropped from 40% at its peak several decades ago to 25% now. The service class does not earn much; it functions often as providing conditions for the creative class (Florida, 2005: 90-99).
2. In the U.S., the most prosperous regions have the highest 3T indicator (Florida, 2005: 257-273):
  - (a) *Tolerance* for differences between neighbors,
  - (b) *Talents* that are attracted by tolerance and chances for creativity, and
  - (c) *Technology* invested in order to use these opportunities.

Over the last decades, the U.S., Australia, New Zealand, the U.K., and Scandinavian countries all can be characterized as innovative societies which have put considerable efforts in developing and applying information literacy promotion and training programs. Their approach to information literacy policy is institutionalized. The forerunners to modern information literacy were bibliographic/library instructions and user education. They supported the users' ability to find their way around in libraries. But today's information literacy includes the users' ability to recognize their information needs in their specific contexts and recognize and evaluate the potential information sources requisitely able to meet their needs. Information-literate persons know how to search successfully, how to reach data/information in different forms, and how data is organized and included into given knowledge. Thus, information literacy extends the traditional literacy concept to meet the more sophisticated needs of people making-up the creative class. Information literacy includes the application of sign systems, the understanding and creative use of information provided by a computer, and communication or reproduction technology (Novljan, 2002: 10). Understanding is the essence of information literacy: it leads toward the requisite holism of library-users' behavior (Petermanec, 2008).

Information literacy's basis is a human's ability to advance once he or she recognizes their information needs, formulates how to retrieve information, and then creates new knowledge with it. Information-literate persons need analytical and critical skills to formulate their research issues and evaluate possible outcomes. Advantages accruing to information-literate persons are many: a sense of greater control in their lives; more independence, self-confidence, self-respect, self-analysis; improvement of their learning and perception of it as a challenge; the selection of quality information; a more global view; a more reflective type of learning; improved memory and concentration; autonomy in learning; the transfer of knowledge transfer; and ultimately more success in their endeavors.

All information literacy definitions share critical thinking, problem solving, and a capacity to use data at work and in other life situations. All sciences, learning environments, and levels of education share information literacy. It is a societal tool to help people define, select, and attain goals that make sense by supporting requisite holism. In libraries and in other parts of the lifelong education, teaching, and learning process, information literacy supports inquiry/creativity/innovation by supporting requisite holism. All these attributes and activities condition humans' quality of life in contemporary times when globalization allows no one to hide from the pressure of competitiveness. Success is no longer based on hard work along, but demands a thorough knowledge base and an innovation base (EU, 2000; EU, 2002; EU 2004). Thus, information literacy belongs to the general trend of humankind's evolution toward an innovative/information/knowledge-based/knowledge-driven/entrepreneurial society (Gu and Chroust, eds., 2005; Florida 2005; Rebernik et al., 2003-2007).

## **The Libraries' Role in Information Literacy**

Involvement of libraries in information literacy is nothing new. It started two centuries ago, progressively being completed and adapted to the needs and possibilities it was proving for itself and seeking its place in the environment to which libraries belong. The oldest proofs of classes on librarianship and information literacy mention Harvard University where Justin Winsor was a professor of bibliography (Owusu-Ansah, 2004, 7).

The first national symposium on libraries in higher education in the U.S. "Libraries and the search for academic excellence" was sponsored by Columbia University and the University of Colorado in 1987 (Breivik and Gordon Gee, 1989, X). It uncovered a serious problem: few professors were aware of the active role of libraries in education. Most individuals think about libraries in a very simplified way. Professors find library service sufficient if they receive books and journals; most students' concerns include the libraries' opening times, the students' right to copy, etc.; and although administrators of schools call libraries the heart of their school, for the most part they neglect them. Few think requisitely holistically about what libraries can offer. The attitude of school managers and professors toward library matters; it strongly influences the students' perception of library/information literacy requisitely holistic or partial, "The best teachers visit and use the library and stimulate their students to do so as well" (Wriston, 1937, quoted in Breivik and Gordon Gee, 1989: 4). This statement is very important for an independent and requisitely holistically behaving student. Integration of information literacy in the curriculum provides an opportunity for academic libraries to influence attitudes and teaching methods supporting autonomous learning by problem definition, and research in the context of problem-based learning.

In the past two decades, in the U.S., teachers, researchers, and librarians of many universities joined their efforts and introduced information literacy programs in higher education. Their effectiveness can be measured by mastery of knowledge and applications with the level of information literacy attained. The libraries' role in the users' training for a permanent and independent acquiring of knowledge can show up in the theory of education, but it covers a lot more in practice: Information literacy effort is included in teaching, and the librarian is a partner in teaching to support requisite holism of courses and students.

One must know, requisitely holistically, the users' needs – concrete, perceived, or latent ones – and build education on these needs. Librarians must know their targeted users and their expressed and tacit needs. A library can provide the noted knowledge produced in its own school or elsewhere, participate in making of new knowledge, and transfer the accumulated knowledge and skills to students/users. The more users are educated, the more they tend to use library services (Kardoš, 2002: 98), and the more users know how to utilize library services, the more they tend to be educated. Education and use of information possibilities are interdependent and interactive.

In education, information literacy matters within two contexts: what to teach (content) and how to teach (process). When students learn what information literacy is, it encourages them to actively use data as information. The teaching and learning strategies increase information literacy while developing independent knowledge to the requisitely holistic level. information literacy is attained in practice in three possible ways:

- Library instructions,
- Independent courses inside the credit system, and
- Content included in other scientific disciplines (related/integrated courses) (Owusu-Ansah, 2004: 8).

Library instructions tend to develop the users' capacity to use libraries and to provide location and orientation skills (Berens, in: Bruce, 1997: 23). Information literacy, as an independent course, covers its theory and practice, which accelerates its applications, one masters more content, one works more rapidly, and then one accepts more information critically. To work smarter rather than just harder or quicker, library users need solutions to tackle both the process and the content. The third way combines knowledge in projects and links theory and practice. It is an open teaching mode in which the teacher initiates and directs, tackling thematically rounded off topics. This requires cooperation of professionals from the content areas and librarians in an integrated teaching form to help library users act requisitely holistically.

These framework descriptions open a new question: Is information literacy requisitely holistic, providing to library users with reliable information rather than fictitious information or even des-information (like our introductory case has shown)? Systems thinking/theory responds to this question.

### **The Traditional Link between Librarianship and Systems Thinking**

According to Prof. Terry Weech (2004: 145), the library profession in the U.S. long ago considered itself a multidisciplinary profession. Later on, "systems thinking could be identified as central to the interdisciplinary nature of librarianship. With an emphasis on holistic thinking in providing information access to all library users, the role of systems thinking in librarianship becomes self-evident. Yet, there is very little discussion in the literature on the relationship between systems thinking and librarianship" (ibid, 148). He adds, "A review of the literature of librarianship reveals a small number of items relating systems thinking to librarianship. Most books and articles focus on how to apply systems thinking to the management of the library, with a special focus on the library as a 'learning organization'" (ibid: 148). In addition, "References to the connection between systems thinking and librarianship were found, however, in the literature of systems thinking. I first became interested in exploring the relationship between librarianship and systems thinking after reading several papers by Professor Matjaz Mulej and his colleagues. What was of special interest to me was the inclusion of libraries and librarianship in their analysis of the role of information in systems. The reference is in the context of discussing companies working with hardware and software supporting communication, but Mulej, Ženko, and Potočan (2002) state that when it comes to the area of informatics, there are many who can be considered involved in the area of informatics, such as librarians, business evidence/intelligence people, journalists, etc." (Weech, 2004: 145). Researchers should be added to this list also.

Systems thinking, according to Weech, is a millennia-old practice, while systems theory was created after WWII. In daily life, one can see that successful persons and organizations have normally been thinking more holistically than one-sidedly (see the literature on innovation, etc.; consider your own personal experience). Their success has normally been based on linking mutually different specialists capable of deep insights and on providing a capacity for interdisciplinary, creative cooperation. In the 19<sup>th</sup> and 20<sup>th</sup> centuries, scientific and practical needs for rather narrow and deep specializations have been killing the equally necessary interdisciplinary creative cooperation. Thus, holism has increasingly become one-sided/fictitious rather than real. Bertalanffy lived through the first seven decades of the 20<sup>th</sup> century and perceived the necessity for a real systems perspective before many

others did (Davidson, 1983). He emphasized behaving as citizens of the entire world and to consider the entire biosphere, explicitly attacking over-specialization (Bertalanffy, 1979: 7)<sup>4</sup>.

In a specialization mind-set, interpretations are invariably one-sided with any holism being merely fictitious and rarely sufficient for success in development or problem-solving on Bertalanffian terms. In our definition, requisitely holistic thinking includes (Mulej, 2007, 352 and earlier):

- (1) *Systemics*; i.e., consideration of the whole entity's attributes – that its parts cannot possess individually but only do so in synergy;
- (2) *Systematics*; i.e., consideration of attributes of each individual part alone, then of another, and so on, step by step, without links between insights, hence no systemics;
- (3) *Dialectics/interdependencies*; i.e., consideration of the relation to parts and their consequences; i.e., synergies making systemic attributes; and
- (4) *Realism/materialism*; i.e., consideration of reality without over-simplification.

All four elements are interdependent in our experienced reality. In principle, humans tend to consider a whole/entity, but their understanding of the whole may vary, depending on their *selected viewpoints*, causing observation, thinking, decision, and action to be something, which modern information literacy can either fight or support (Tables 1 and 2). Therefore, education for information literacy should support education for requisite holism by keeping to a systems thinking orientation (see Table 3) (Mulej et al., 2004: 55):

<b>Systems / Systemic / Holistic Thinking</b>	<b>Un-systemic / Traditional Thinking</b>
Interdependence/s, Relation/s, Openness, Interconnectedness, Dialectical System	Independence, one-way dependence, closeness, a single viewpoint/system
Complexity (plus complicatedness)	Simplicity or complicatedness alone
Attractor/s	No influential force/s, but isolation
Emergence	No process of making new attributes
Synergy, System, Synthesis	No new attributes resulting from relations between elements and with environment
Whole, holism, big picture	Parts and partial attributes only
Networking, Interaction, Interplay	No mutual influences

Table 3: The Basic Seven Groups of Terms of Systems Thinking versus Un-systemic Thinking

Mulej created Dialectical Systems Theory (DST) in order to render Bertalanffian holism feasible. DST's applications have proved fruitful in many cases (Dyck, Mulej, 1998; Ećimović, Mulej, Mayur, 2002; Ećimović et al., 2007; Mulej & Potočan, 2007). Hence, we are suggesting this kind of systems theory to be used in solving the problems of information literacy in librarianship, science, and daily life. Librarians are interdependent with library users.

We believe Troncale (2002) is right – systems science is the science of synthesis and integration. This applies to relations between librarianship and systems thinking, too. However, it can hardly be attained, unless incidentally, if information literacy does not include systems thinking based on a systems theory which makes the left column of the Table 3 practicable. Literature on innovation abounds. Still, we did not detect literature calling information literacy an important factor of success in innovation although it obviously belongs to preconditions of success once it attains requisite holism.

## **Information Literacy – a Systemic Step in Innovation of Libraries**

Information literacy affects both the librarians and library users. It reaches beyond modern information and communications technology by requiring much more holism. The inscriptions on stones, etc., from the ancient times kept knowledge safe from being forgotten. Gutenberg is the undisputable winner in diffusion of knowledge by the printed literature. Literacy was added. Now, in data flows of scientific information, the internet obviously plays an essential role. However, this technology is easily misused. Evaluation of data, messages, and information demands taking into consideration how the needs of individuals/teams are changing: from viewing libraries as rooms full of books into a complex dialectical system of viewpoints and actions providing a linking of knowledge of others with the user's knowledge in a learning-by-doing manner.

In the 1970s, people learned that information literacy requires a new complex network of capacities/skills to efficiently/effectively use data as information. In the 1980s, people celebrated information technologies and a higher level of critical thinking. Libraries had an important role in the learning process, but no exclusive-source role. It must be recognized that library skills and computer skills alone are not sufficient for information literacy. In an information society (as a partial, but essential attribute of the innovative society), information literacy extends traditional literacy. The future challenges lie in universal literacy within a world of communication and knowledge. It can help humankind to attain more possibilities of choice and reciprocity in information exchange.

### **Conclusions**

Requisitely holistic information literacy overcomes the limitations of exaggerated one-sidedness and over-specialization. Specialization is unavoidable, of course, but so is the capacity of interdisciplinary co-operation. Modern, innovated information literacy can significantly help to meet this need. The role of the library within a requisite holistic framework is therefore crucial; it can support the promotion of innovation and an innovative society.

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## Endnotes

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- <sup>1</sup> The word *system* has many contents. In mathematics, the most abstract level of thinking, it is always a rounded-off whole. In the less abstract sciences/practices, specialists limit themselves to the whole/system inside their own specialized viewpoints. This is an unavoidable reduction from all existing attributes of the topic under consideration to the ones, which are found to be crucial/requisite. In reality, a single discipline is very rarely enough for requisite holism with beneficial consequences; there are too many oversights if different specialists do not cooperate creatively. The latter situation is reflected in and enabled by using the Mulej/Kajzer law of requisite holism (1998), which applies Mulej's notion of the 'dialectical system' (Mulej, 1974, 1975, 1979 and later).
- <sup>2</sup> The yin-yang aspects of many millennia ago and dialectics denote interdependence of the mutually different and therefore mutually needed parts of nature (See: Mulej et al, 2000). Specialists are often taught inside their own specialization and remain locked in. Without interdependence-based interdisciplinary cooperation, they attain a fictitious holism, mostly, rather than a requisite one. Their insights are limited to their single viewpoint. Oversights result, making success rare. Awareness and ethics of interdependence are necessary attributes, which many lack/miss, along with their specialization. Requisite holistic information literacy could support humans' requisite holism.
- <sup>4</sup> Warnings of today about melting icebergs, the warming atmosphere, and increasingly many hurricanes, etc., demonstrate that Bertalanffy has been right (e.g., Ecimovic et al., 2002, 2007). IL exists, but specialists use it with oversight that their IL provides too narrow insights, thinking, decision making, and action. United Nations' documents on sustainable development, etc., require humans to apply systems thinking, as do many other documents. They should help IL become more/requisite holistic.