

MAREK HETMAŃSKI

Cognitive Needs and Information Demands in Education. How Technology Shapes Education Systems

1. Introduction

Modern education, involved and entangled by information technology, confronts all of its participants – students and teachers, children and parents, practitioners and theorists, schools or universities and governmental institutions – with the same emerging new and ambiguous phenomena. Sophisticated tools designed to amplify cognitive undertakings are increasingly complex and engage unreasonable users' attention distracting them from other activities. Information overload as well as lack of it, resulting from the above facts, becomes the main psychosocial obstacle in effective education. Thus, it seems evident that education entangled excessively by information technology has the unexpected side-effects and unwelcome consequences ignored in the recent optimistic opinions and theories. As a core of arising situation, one can take for granted that **natural cognitive needs** – wish to know, desire to understanding, self-knowledge, curiosity – are more and more restricted and even substituted by the **artificial demands** – to be informed no matter the content of the news, taking part in the networked communication – resulting merely from the technological possibilities and constraints. Shortly speaking, information technology shapes the education, its processes, both learning and teaching, its institutions and programs, excessively. Since its civilization origins, the education systems – from the early beginnings based on the sustained balance between inner natural **agent's needs** and external **institutional demands** – seem recently to change their previous natural trajectory and go to the questionable directions.

The problem is worth of conceptual studies because the information revolution in education is not ended and still undergoes multidirectional changes. Philosophical, particularly, epistemological analyses may help to shed light on it and state its

to fulfill these activities just only to their, technological not educational, possibilities and requirements.

How does this situation look like from the psychological perspective? The need for information is neither special nor the most important need of human beings. If a need is an inner motivational state that brings about human thoughts and behaviours, the need for information – **information need** – is very closely connected with the large set of cognitive-intellectual mental states like perceiving, believing, remembering, imagining, forecasting, expecting as well as doubting, fearing or intuition. Information need is an element in the structure of common practical-cognitive attitudes that people assume in real-life situations. However, information need is a psychosocial phenomenon, more complex than one could expect; in fact, it is a **cognitive need**. As cognitive scientists have demonstrated, cognitive needs themselves have to be separated from merely biological (physiological) desires and wants which, in fact, have no real impact on agent's information/cognitive needs. The particular desire, suggestive or intensive, is not the same as a cognitive need; even an intentionally formulated plan or a strategy (as the life-intentions) does not equal with the actual cognitive need.

One could want to, considering the typical example in education, search all library catalogues looking for special data, whereas one's real, objective information need would be just to browse or scan a concrete bulletin or journal. It implies that information needs depend on many objective as well as subjective circumstances. Generally speaking, information needs of an agent must be: (1) instrumental in reaching desired goals by using different means, tools, and instruments to accomplish these goals; (2) necessary, not apparent or enforced (recommended), in the sense of being important for the agent's vital life's cognitive needs which may actually change his/her course of conduct; (3) true (but not only in the strict epistemological sense) with respect to the real (objective, not imagined) situations or positions of a person who seeks particular knowledge. Another important criterion of a cognitive need (not a mere desire to be acquainted with imagined or simply wanted things or ideas) is the agent's behaviour in which the information needs are met and expressed. The behaviour such as acts, individual conducts, co-operations, social attitudes, utterances, communications, etc., in which human needs are expressed as well as the instruments that effectively realize them, are proper criteria which tell us when and why people have real cognitive needs.

Another important distinction, of epistemological importance, explaining what is the essence of cognitive want (search for knowledge) is the juxtaposition of needs versus **demands**. This opposition helps to assess properly and justifiably the role played by cognitive needs in the educational processes and efforts and technological enhancement of them. Generally speaking, one should talk about needs that people actually have (cognitive motives of which they are very often not fully aware) and which actually control their cognitive-practical behaviours and

undertakings. To make this, one should not, however, rely on their declarations in this matter or apparently pseudo-cognitive attitudes which people very often subjectively experience. People, especially pupils at the beginning of their educational pathways, very often do not recognize the essence of their needs and demands. This psychosocial phenomenon – agent's consciousness when he/she is not fully aware of these needs and wants as well as differences between them – is, as I want to stress again, educationally dangerous. When pervasive computer technology impinges so deeply on young pupils left to themselves, especially without reasonable teacher's assistance, any natural cognitive process will not develop properly; it might happen that natural, spontaneous cognitive motif (e.g. curiosity) has been "technologized" becoming artificial demand (e.g. will to win or compete). The same happens if teachers forget that all possible (almost uncountable) usages of computerized programs and tools in learning or training do not guarantee their users achieving the same, always good and unproblematic, results. In this sense, there is a unquestionable difference between natural, spontaneous, individual agent's cognitive needs and external, sophisticated, socio-cultural **informational demands**. These demands might be based somehow on the natural agents' abilities and wants, however, they are mostly artificial. Wise and responsible educators as well as their educational theories and programs should concentrate on the former and be more critical towards the latter.

The solution of the above mentioned dilemma is offered by the psychological research programs one can find in the recent cognitive science and research programs on information.⁴ There are namely three approaches and their particular strategies which supply objective and verifiable methods how to recognize and subsequently evaluate natural (desirable and fruitful) cognitive needs in front of external (artificial and inadvisable) demands and requirements. They may be used, as I want to mention, in discussion of civilization (technological) changes which education systems undergo most recently.

The first strategy depends on distinguishing such features of a particular realization of educational agent's needs as: (a) conscious, expressed in utterances, and communicated his/her mental states and corresponding (b) behaviours and attitudes. If the inquirer (i.e. student/teacher looking for information), for example, after mental deliberations puts in words or questions a cognitive need after receiving the answers from an information source, then he/she declares and fulfils an actual informational need; central to the entire process is then the agent's (both student's and teacher's) ability to communicate desires by negotiating questions and answers. The amount, as well as the nature of the conveyed questions, tell then

⁴ D. Case, *Looking for Information. A Survey of Research on Information Seeking, Needs, and Behavior*, (Amsterdam: Academic Publications, 2007) pp. 69–81.

can analyze all humans cognitive endeavours, particularly, information behaviours. As Donald Case holds:

The prototypical search for the Objective point of view is one in which there is a well-defined need to retrieve a specific fact to make a decision or solve a problem. From this perspective, information need are thought to be relatively fixed. (...) In contrast, the Subjective pole represents the idealized view that many (an perhaps even the majority of) searches for information are prompted by a vague feeling of unease, a sense of having a gap in knowledge, or simply by *anxiety* about a current situation. This view does not deny that purposeful thought leads to information seeking, but rather emphasizes that humans are often driven to 'make sense' of an entire situation, not merely its component 'data', and that rational goals are often overstated. Under such a view, information needs are highly dynamic.⁶

3. Information overload and cognitive attitudes towards it

The most evident consequence of pernicious impact of technology on our life is an **overload of information**.⁷ It is not a single phenomenon that could happen everywhere, anytime, and in the same way. It occurs recently in education, professional undertakings, mass communication, pop-culture, etc. The effects of it in educational matters are, after all, of particular importance; it should be then investigated and estimated carefully. Coping with redundant and meaningless information both pupils and teachers are inhibited from the core educational tasks as understanding of what is learned and what is taught. Components of information technology, i.e. hardware, software, programs, networked systems, etc., are standardized and work following the algorithmic patterns. But people use them differently for different purposes and in accordance with their computer literacy skills. As these skills differ significantly depending on the age, training, gender, cultural standards, etc., computerized tools and systems do not guarantee the only one and always effective access to information. Education programs equipped with the computers do not provide their users with knowledge. It happens very often that effective information processing tools and systems generate exponential increase of data which are out of any understanding. Even in education, where processes of learning and teaching are highly standardized and seem to rule the students' undertakings in the same way, there are not identical

⁶ *Ibidem*, pp. 76–77.

⁷ See: M. Hetmański, "Information Overload and Information Needs", in W. Karwowski, J. Kantola (eds.), *Science, Technology, Higher Education and Society in the Conceptual Age*, (London/New York: Taylor & Francis, 2013) pp. 549–558.

and comparable effects in knowledge acquiring or information using. It is one of the reasons for the occurrence of the phenomenon of excess of information. And this is why people feel overwhelmed, if not threatened with it. Interestingly enough, information overload is brought about not only through automatically incoming information, which is not welcome by users, but it is caused by lack of proper skills to manage and use the information systems. Paradoxically, elementary computer training and education instead of developing careful usage of information systems, enthusiastically but not critically, promotes only technological effects instead of cognitive ones. Too much often, educators and educational institutions are concentrated on the former, not the latter.

Generally speaking, information overload does not always evoke the same subjective feelings in the agent. It may happen that he/she experiences in such cases a feeling of anxiety and fear of coping with uncertainty or overload of information. According to Abraham Maslow's statement "we can seek knowledge in order to reduce anxiety, and we can also *avoid* knowing in order to reduce anxiety".⁸ The quest for certain knowledge or at least sufficient information may lead to the positive and satisfactory results but it may also fail and bring about negative (counter-cognitive) emotions and attitudes. If the second possibility happens, the chances of reducing the overload, as well as lack of information, decreases inevitably. And then epistemic paradox occurs – managing information changes cognitive needs and finally blocks searching of knowledge. Coping with extreme amounts of information might stop looking for something which could turn out to be valuable knowledge. There is no knowledge acquiring without previous proper choice among possibilities carrying the information amounts; any obstacles during this process (e.g. decision making) weaken, if not destroy, learning or teaching. If it happens at early stages of learning in elementary school, the results undergoing in the agent's mind are devastating for his/her future education. Young learners are not able to cope properly with the above situations and it might happen, as both research and parents' common experience show, that they take information overload as the natural and unavoidable state of learning.

4. Technology enhanced education – what it is in fact?

Education dominated by technology is then the place where all above mentioned processes, both positive and negative, occur recently. Considered as a complex and changeable process and not as a stable state, education is a distinctive phenomenon

⁸ A. Maslow, "The need to know and the fear of knowing", *Journal of General Psychology*, vol. 68(1) (1963), p. 111.

to help learners and teachers to maximize the real goal of learning and achieve the positive cognitive outcomes that are to be found beyond technology. Neither technology design nor skillfulness in its usage are aims of education. The brain/mind cognitive perspective (to which computer perspective is only subjected) is more crucial. In achieving educational aims such as understanding, comprehension and critical thinking, using the Bruner's "computerized toolkits" must be both reasonable and reasonable.

The agent-oriented educational process has two elements: learner's attention and teacher's intention. Both of them are concentrated on two different, neither opposed nor disjunctive, directions and aims. Teacher initializes and steers education process, while learner focuses his/her attention and endeavours on coping with received and gathered materials. For the many social and cultural reasons, the former is obliged to maximize the levels of knowledge while the latter is compelled to minimize the amounts of information; only in a very few cases both processes meet together effectively. The difference between these educational pathways and their aims becomes evident when specific educational technology is subsequently considered; it is exactly technology that evokes as well as stops both processes. "Ideally, learning support systems should help students to better control their own learning processes. (...) Therefore, digital tools assisting learning environments must provide learners with the help necessary to direct and sustain attention to the appropriate tools and information; further, this support must evolve with the student's knowledge and skills. In educational psychology this evolving support to students is called *adaptive scaffolding*".¹³ This kind of instrumental enhancement, cognitive scaffolding, should provide the teacher with diagnosis on what is going on when the learner fulfills his/her part of education endeavour, especially, "the learner's attention-allocation processes" during the coping with the information overload and making decisions.

5. Summary

Modern education entangled excessively by information technology confronts all its participants with the unexpected side-effects and unwelcome consequences. Sophisticated tools and programs designed to amplify cognitive undertakings are increasingly complex and engage very much the users' attention distracting them from other activities. Natural cognitive needs such as wish or desire to know, to be properly informed, which are partially inherited, are more and more shaped,

¹³ I. Molenaar, C. Roda, "Attention management for dynamic and adaptive Scaffolding", in I. Dror, ed., *Technology Enhanced Learning and Cognition*, op. cit. p. 52.

restricted and even substituted by the external, artificial informational demands resulting merely from the technological possibilities as well as constraints. As these needs and wants are intensively exaggerated they become the external informational demands and institutional requirements. People are more and more engaged in activities in which they tend to know what is not needed but just only seemingly presented as an informational demand. It happens very often in education where natural, spontaneous individual pupil's and student's cognitive needs are confronted with informational demands which impose very much on what they perceive, imagine and think. The situation when both students and teachers are not fully aware of these demands is educationally dangerous. The paper considers such situation, especially its consequences concerning all education participants – students and teachers, pupils and parents, practitioners and theorists, schools and universities as well as governmental institutions and organizations. Jerome Bruner's culturalism and research results will be used in considering the impact which technology has on the education processes including cognitive needs versus informational demands.

Bibliography

- Bruner, J., *Education Culture*, (Boston: Harvard University Press, 1996).
- Case, D., *Looking for Information. A Survey of Research on Information Seeking, Needs, and Behavior*, (Amsterdam: Academic Publications, 2007).
- Dror, I. E., (ed.), *Technology Enhanced Learning and Cognition*, (Amsterdam/Philadelphia: John Benjamin Publishing Company, 2011).
- Hetmański, M., Information Overload and Information Needs (2013a), in W. Karwowski, J. Kantola* (eds.) *Science, Technology, Higher Education and Society in the Conceptual Age*, (London, New York: Taylor & Francis), pp. 549–558.
- Hetmański, M., Uncertain Knowledge in the Theory of Bounded Rationality, (2013b) in V. Yevtuh, R. Radzik, A. Kisla (eds.) *Ethnosociological and Epistemological Discourse in Scientific Space*, Kiev, pp. 181–200.
- Maslow, A., 'The need to know and the fear of knowing', *Journal of General Psychology*, vol. 68(1), (1963) pp. 111–125.
- Molenaar, I., Roda, C. (2011), Attention management for dynamic and adaptive Scaffolding, (2011) in I. Dror (ed.), *Technology Enhanced Learning and Cognition*, op. cit. pp. 51–96.