Objectiveism vs. Constructivism Re-visited: An Interpretation in Online and Distance Learning Environments

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Keywords

Objectiveism vs. Constructivism, online and distance learning, paradigm shift

ABSTRACT

This paper considers the two positions held towards the epistemology of knowledge, namely, transmission and construction, in the field of distance education. It first examines the historical discussions regarding the two positions as espoused in psychology and education. It then moves on to examine the new learning paradigm posited by Ertmer and Newby (1993) as a viable model of knowledge, which considers all the major stances towards knowledge and learning (behaviorism, cognitivism, and constructivism) to be a matter of levels that occur concurrently. Second, it looks at how distance education has supported these two positions via technology (or media) use in their actual application. The paper considers that the appropriate usage of technology, especially the introduction of online components in program/course design, could now support both transmission and construction models of learning in distance education. To conclude, the paper suggests that transmission vs. construction arguments may now be becoming a variable to be planned for and chosen in a given instructional context and that another paradigm shift of knowing and learning may be necessary that better explains the “thought structure” that learners of newer generations may have in education in this digital era.

This paper considers the two positions held towards the epistemology of knowledge, namely, transmission and construction, in the field of distance education. It first examines the historical discussions regarding the two positions as espoused in psychology and education. It then moves on to examine the new learning paradigm posited by Ertmer and Newby (1993) as a viable model of knowledge, which considers all the major stances towards knowledge and learning (behaviorism, cognitivism, and constructivism) to be a matter of levels that occur concurrently. Second, it looks at how distance education has supported these two positions via technology (or media) use in their actual application. The paper considers that the appropriate usage of technology, especially the introduction of online components in program/course design, could now support both transmission and construction models of learning in distance education. To conclude, the paper suggests that transmission vs. construction arguments may now be becoming a variable to be planned for and chosen in a given instructional context and that another paradigm shift of knowing and learning may be necessary that better explains the “thought structure” that learners of newer generations may have in education in this digital era.
による支援との関係を，遠隔教育の立場から論ずる，とりわけ，オンラインによる授業の設計は，客観主義・構成主義ともとづく知の様態のいずれをも遠隔教育において可能とするものであると考えられる。結論として，客観主義・構成主義をめぐる議論はある特定の教育コンテクストに付随するひとつの変数と考えられ，デジタル時代に育つ新たな世代の学習者たちの新たな「思考構造」により合致した知と学びの様態を表現する新たな知のパラダイムの必要性が示唆される。

1. Epistemology of learning

1.1 Location of the issue

The issue of transmission vs. construction can be regarded to be an issue of instructional approach – how we try to realize a certain learning outcome. Following this line of thought, the issue is further decomposed to the problems of 1) supporting learning theories, 2) source of knowledge, and 3) content of knowledge in order to discuss how different instructional approaches are founded on different beliefs in knowledge and learning (parts of this framework were inspired by Driscoll, 2005; Jonassen, 1991). The table below outlines the key arguments relevant to the discussion of the epistemology of learning.

<table>
<thead>
<tr>
<th>Epistemology of knowledge</th>
<th>Instructional approach</th>
<th>Supporting learning theories</th>
<th>Source of knowledge</th>
<th>Content of knowledge (Ontology)</th>
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<tbody>
<tr>
<td>Subject</td>
<td>2nd person</td>
<td>2nd person</td>
<td>1st person</td>
<td>3rd person</td>
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<td>Question</td>
<td>How</td>
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<td>What (object)</td>
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The two positions towards knowledge and learning of transmission and construction are considered to be founded on the opposing views in the ways that we (2nd person) realize what knowledge content (3rd person) is to be learned by our learners (1st person). Specifically, we could consider the issue of transmission vs. construction from the perspective of the focus we take towards knowledge and learning; that is, the supporting learning theories and source of knowledge arise from how we realize knowing and learning whereas the content of knowledge is what we are going to know and learn by these actions.

1.2 Psychological foundations

Teaching practice has been largely influenced by the prevailing educational philosophies of a given time. No one would deny that the field of psychology and education has witnessed the appearances of learning theory paradigms in the order of behaviorism, cognitivism, and
constructivism (Driscoll, 2005; Ertmer & Newby, 1993).

Behaviorism, which is most often associated with the names Pavlov (1904), Watson (1913), and Skinner (1954), admits only observable changes in behavior and posits that an expected learning outcome is conditioned by the reinforcement of stimulus-response association (Kearsley, 2007). Cognitivism, which focuses on the internal perception and change of the learner, and which is often associated with the names of Ausubel (1978), Mayer (1999), Sweller (1998), Bruner (1991), Gagné (2005) and others, set the scene for the rise of information processing theories, schema theory, and cognitive load theory (Driscoll, 2005). Constructivism, which can be regarded as an extension of cognitivism, focuses on the process of how learning occurs in relation to the outer environment of the learner, and is often associated with the names of Piaget (1955; 1968), Vygotsky (1978), Lave (1991), Wenger (1991; n.d.) and others, produces a series of social learning theories (Driscoll, 2005). As a comparative table of epistemological traditions, the respective leading figures, and learning theories are summarized in Table 2.

<table>
<thead>
<tr>
<th>Major learning theories and their proponents</th>
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<td><strong>Proponent</strong></td>
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<td><strong>Behaviorism</strong></td>
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How people consider the mechanism of learning also relates to how people look at the world. The issue of transmission vs. construction epistemology is often said to be supported by two opposing views towards reality; that is, objectivism and interpretivism. The former thinks that reality exists independently from the learner him/herself (realism) whereas the latter denies the existence of absolute reality (skepticism); consequently, objectivism takes the position that transferring knowledge leads to learning whereas for interpretivism, knowledge is constructed in a given environment by the learner him/herself (Driscoll, 2005; Jonassen, 1991).

Looking at the actual application of these positions of transmission vs. construction in teaching practice, objectivist approaches are most often represented by the implementation of drills, practices, rote learning, etc. rationalized
by the evaluation of multiple-choice and true/false tests, because the knowledge of content is believed to be objective and measurable and, therefore, what the learners have acquired can be tested measurably (Smith & Ragan, 2005). On the other hand, when we take a constructivist view, learners interpret the instructional messages in a context which varies widely among the individual learners. Therefore, our attention is more directed to providing learning environments where learning can occur in a manner meaningful to a specific learner: the concepts of guidance, facilitation, self-regulation and so forth, are all in line with the ideas of constructivism (Driscoll, 2005). Accordingly, our measurement of the learning outcomes will be based on more flexible criteria than that of objectivist beliefs (Jonassen, 1991).

When looking at the issue from the learners’ perspective, the issue of transmission vs. construction can be supported by another set of two opposing views – that is, rationalism vs. empiricism – in the manner in which learners are considered to gain knowledge. Rationalism takes the position that knowledge derives from preexisting reason or the mind of the learner; therefore the main role of education is to help recall what is already known by the learner. Empiricism, to the contrary, regards experience as the primary source of knowledge and so the role of education is to manipulate the environment (including sensory representations) to “ensure the occurrence of proper associations” (Ertmer & Newby, 1993, pp.54-55).

As cognitivism and constructivism are not easily separated but have evolved by mutually influencing each other (Ertmer & Newby, 1993; Siemens, 2007), to aim for a more comprehensive view of the issue of transmission vs. construction, this paper takes the position that the transmission model is underpinned by behaviorist thought while the construction model is predominantly supported by constructivist thought. Cognitivism is taken to be “closer to the rationalist end” (Bower & Hilgard, 1981, p.58 in Ertmer & Newby, 1993) from the source of knowledge perspective but, in that its attention is towards what is happening inside each learner in a given context of knowledge (Driscoll, 2005), it is considered to be closer to the beginning of constructivism: these interpretations are reflected in Table 1 and 2 by the dotted lines.

When focusing on the flow of knowledge and how information is directed, it can be said that the transmission model tends to be one-directional (knowledge provider to knowledge receiver) whereas the construction model is bi/multi-directional (knowledge is acquired through interactive processes between a learner and other elements). This point will be further looked at in Section 2, where the paper considers how to realize this interactive feature in distance education.

1.3 Relativism of the paradigms

When applying the traditional understanding of transmission vs. construction arguments we may encounter some difficulties with their application in teaching practice. For example, it is safe to say that, at least historically, objectivism is often regarded as an older paradigm of knowledge than interpretivism with the connotation that constructivism is a newer and in a sense, better or higher epistemology than objectivism: this is partly illustrated in the statement that says "...It is important that we have discovered that learning for the most part is neither rote learning nor the learning of mechanical procedures...It is vital that the mistaken views about the mind [objectivism] that have been with us for two thousand years be corrected" (Lakoff, 1987, pp. xi-xvii). The
fundamental point to be raised in this context is how objectivism (or behaviorism) can deal with the acquisition of higher levels of skills and thinking (Schunk, 1991 in Ertmer & Newby, 1993).

To this Ertmer and Newby try to answer, relying on two categories; that is, 1) the kind of knowledge to be obtained, and 2) the kind of task to be learned. For the first point, they think that:

...a behavioral approach can effectively facilitate mastery of the content of a profession (knowing what); cognitive strategies are useful in teaching problem-solving tactics where defined facts and rules are applied in unfamiliar situation (knowing how); and constructivist strategies are especially suited to dealing with ill-defined problems through reflection-in-action (1993, p.68).

From the task perspective, Ertmer and Newby developed a visual representation to illustrate that the three epistemological stances are different in the levels of task knowledge and cognitive processing to conclude that the constructivist stance is the highest followed by the cognitive and the behavioral (Figure 1). Therefore, they admit that all the epistemological stances towards learning are equally valid, depending on what sort of knowledge and task are intended to be acquired.

![Diagram](image)

**Figure 1.** Comparison of the associated instructional strategies of the behavioral, cognitive, and constructivist viewpoints based on the learner’s level of task knowledge and the level of cognitive processing required by the task (Ertmer & Newby, 1993, p.69)

In line with this direction where chronological linearity is being questioned, there exist also some new concepts that question this hierarchical understanding of knowledge paradigms. The first is the position espoused by Siemens (2005) called Connectivism, which based its vision on the idea of “learning as a connection-forming (network-creation) process” (page unidentified). In this view, “learning is the act of encoding and organization of nodes to facilitate data, information, and knowledge flow” in a network. This sort of meta-level soft paradigm of knowledge...
that encompasses or goes beyond the existing knowledge paradigms (behaviorism, cognitivism, and, constructionism) may better describe the mechanism of the “thought structure” that has been brought by computers and the Internet.

Another paradigm that is relevant, especially to the transmission model of knowledge and learning, is termed Navigationism (2006) by Brown. Drawing on the work by Siemens, he extends his view by especially focusing on the information overflow created by the numerous Information and Communications Technology (ICT) tools that have become available today. He considers that the knowledge transmission role of education has ended as today’s learners are drowning in too much information in their daily lives; rather the new role of educators is to be coaches and mentors and let learners learn how to navigate in the overflowing ocean of knowing and learning.

Though it is not certain if these positions are predicators of paradigms that will become more accepted in the field in the future, this paper considers that this sort of new direction that is not bounded to the traditional knowledge and learning epistemologies will show its value because, as we will see in the following sections, the ever-accelerating globalization that is brought about by new technologies and consequent communication and collaboration networks at various levels that connect numerous different contexts simultaneously, is now demanding of us a new “paradigm shift” of knowing and learning. This sense of impending change coincides with recent work published by EDUCASE, edited by Diana and James Obliger (2005), entitled “Educating the Net Generation,” which suggests the necessity of having new ways to live and learn with the new generation who have been brought up with the digital environment since their naissance: “the Net Generation” is defined as those born after 1982, or those of younger than 24-25 year old as of 2007. This means that the core body of learners in higher education in contexts where technology is sufficiently advanced may be encountering the direct effects of this new generation’s thinking already. If this is the case, it is valid to think that we should be expecting not necessarily a new paradigm of knowledge acquisition but at least a new paradigm of teaching and learning in this modern digital era.

2. Application in distance education

2.1 Particularity of distance education

To examine the application of technology in distance education, we should first confirm those features peculiar to distance education. Keegan’s frequently referenced model, outlining five aspects of distance education that distinguish distance education from other forms of education, is helpful. Keegan considers that 1) the quasi-permanent separation of teacher and learner, 2) organized learning in contrast to private study, 3) use of technical media, 4) provision of two-way communication, and 5) the quasi-permanent absence of the learning group (1996, p.50) as particular aspects of distance education. As they demonstrate, the use of technology (or media) plays an indispensable role in all five aspects in delivering and maintaining the modern type of distance education. Furthermore, depending on the readiness of technology in a specific environment, we may now modify the last aspect to be the “provision of the learning group” as the online learning group and community connected via social software is rapidly becoming a common strategy for distance education delivery.

The concept of blended learning, or a certain mixed-level of face-to-face and online components
(Pershing, 2006) in distance education, is also to be mentioned. The six categories given by Thompson (1989), focus on different types of interaction that technology can support in distance education, and are in line with the flow of this paper’s arguments because they help clarify how blended learning brings constructive elements to distance learning:

Type 1: one-way
Type 2: delayed two-way
Type 3: synchronous two-way
Type 4: remote asynchronous group
Type 5: occasional face-to-face
Type 6: fully supported face-to-face

As we can see, some types of distance education include face-to-face components such as cases four to six (sometimes called “schooling” or “grouped study”). This leads to another dimension that the transmission vs. construction components can be assigned to: the different modes of instruction within a given distance course or program. For example, the combination of predominant knowledge transmission by print readings and predominant knowledge construction by face-to-face classroom discussion could be designed into a course. On the other hand, it is not clear that we can assume that face-to-face learning works in a constructivist manner because a unidirectional lecture type of class meeting could take place in the face-to-face meeting. This leads us to consider that the issue of transmission vs. construction should be balanced among many factors and elements in a given context, which will be further considered in the following sections.

2.2 Technology in distance education

The historic debates between Clark (1983) and Kozma (1991) are the seminal papers on this topic on how technology has been an indispensable tool for bridging the geographical gap between the provider and the learner in distance education. Clark is known to take the position that media itself does not directly influence learning, whereas Kozma claims that media and learning are highly related. Though a close look at the two key papers shows that the two do not actually take directly opposing views toward technology (or media) and learning, it is important to confirm that existence of a correlation between different uses of technology (or media) and learning effectiveness – whether one accepts or denies the relation – is a foundation of this research question regardless of whether the learning is delivered via face-to-face or distance learning.

For the transmission or transferring knowledge, the use of print (texts), radio and cassette tapes (audio), television and video (video), and information and materials provided in the form of digital information (CD, DVD, WWW, etc.) have become commonly used tools of knowledge delivery in distance education. On the other hand, more recent tools such as software and systems (telephone, CD, DVD, TV, satellite, e-mail, etc.) and a variety of multimedia conferencing systems (IMM, CMS, LMS, etc.) now make it possible to provide interactive features or constructive processes in distance education (Bates, 2005; Taylor, 2001). Therefore, it is fair to say that, at least technically, more recent types of distance education hold a variety of means to incorporate both transmission and construction components in its design scheme.

To look into the constructive delivery of information, the distinction between synchronous and asynchronous communication is helpful. Synchronous means “happening at the same time,” while asynchronous means “happening at different times” (Schlosser & Simonson, 2002, p.51 & p.162). From the learners’ perspective,
synchronous tools are characterized by “time/place/pace dependence,” whereas asynchronous tools are characterized by “time/place/pace independence” (Taylor, 2001). Synchronous tools are often represented by text/voice chat, VoIP (voice over internet protocol), and live audio/video conferencing, while the asynchronous tools are represented by post mailings, faxes, e-mails, blogs, BBS (bulletin board system), and LMS (learning management system).

When adding the interactive components in a distance course delivery, the concept of interaction or bidirectional communication is commonly used (Moore & Kearsley, 2005; Schlosser & Simonson, 2002). The conceptual framework of distance education by Taylor (2001) provides another analytical tool to help us combine the issue of transmission vs. construction and technology use: he analyzes the characteristics of distance education over a period of years and deduces five generations from the transition of technology usage. Among the characteristics he focuses on is interactivity, and he observes that the introduction of computer based learning draws a line from the absence (no) to presence (yes) of interactive delivery in distance education: this feature has been paid attention to, not only in distance education but in higher education in general, because its online discussion function is considered to be a powerful tool to foster 1) academic discourse, 2) critical thinking skills, 3) knowledge construction, 4) problem-based learning, and 5) collaborative learning (Bates & Poole, 2003, pp.232-238).

Though construction or interactive features in distance education may have been traditionally discussed concerning the extent it could replicate face-to-face learning (Russell, 1999; Phipps & Merisotis, 1999), the comparative study between face-to-face and distance learning by Bernard et al. (2004) adds another dimension to this discussion. Their analysis is suggestive because the issue of transmission vs. construction could be further decomposed into two different phases or levels of distance education, that is, content delivery vs. knowledge construction. In the case of the online programs recently launched by Touro University International (US), for example, this combinatory position seems to integrated fully online as it is announced on their official website, using “synchronous learning (via Internet videoconferencing) as well as asynchronous learning (via CD-ROM),” as its main course delivery configuration at master and doctoral levels (TUI, 2002). From this perspective, if research data does not support any major difference in the effectiveness of transmitting knowledge between face-to-face and distance learning, it is valid to narrow down our research focus to what level of constructive component we would like to realize in distance education under the condition that the content delivery system is working sufficiently.

2.3 Other variables

The subject aptitude of certain program/course content towards transmission and/or construction approaches in distance education is relevant. For this, Gagné’s five domains of learned capabilities outcomes from an information processing perspective (in the terms of this paper, a cognitivism-constructivism perspective) may help; that is, he categorizes 1) intellectual skills, 2) cognitive strategies, 3) verbal information, 4) attitude, and 5) motor skills as learned outcomes (2005, pp.10-11). Though Gagné emphasizes that these capabilities are not exclusive but multiple aims for instruction are necessary, it is fair to say that the transmission model appeals most to the verbal information category whereas intellectual
skills and cognitive strategies are reserved for the constructivist approach. Though the subjects in the categories of attitude (for example, ethics) and motor skills (for example, physical education) exist and are important parts of many of school curriculums, it becomes less clear how we could fit these kinds of subjects into the scheme of the transmission and construction paradigm. Also, historically, careers such as “lawyers, doctors, architects, and businessmen” have been considered to require a degree of apprenticeship (Resnick, 1987 in Ertmer & Newby, 1993, p.66), and therefore have been considered to be less suited to distance education; however, this may soon be addressed by the introduction of distance simulation – role-play training in a simulated digital context, similar to that of airplane pilot training (Appleman & Wilson, 2006).

Another important factor that may be rather unpredictable is the choices made by individual learners. As Talyor (1995) notes, at least historically, the stakeholders of distance education have been “largely of part-time students in full-time employment.” From this comes the necessity that “distance educators have had to provide resources (printed study guides, audiotapes, videotapes, computer-based courseware, etc.) of high quality that could be used at a time and in a place convenient to each student” (page number unspecified). Though comprehensive data analysis is required, the composition of distance learners in higher education and therefore their possible expectations of distance learning in our context may overlap with Talyer’s observations. For example, in the University of the Air, Japan (UAI), 77.1% of graduates are in full-time work out of a total 1,147 students who have successfully completed the programs (males 65.0%, females 35.0%), though for the undergraduates, the percentage lowers to 52.9% out of 40,601 students (males 36.4% and females 63.6%), and 59% of current undergraduates at Keio University hold some kind of work commitment as of 2006 academic year. Therefore, even though it is technically possible for construction components to be implemented, it could be the case that asynchronous delivery is preferentially chosen by both provider and receivers of the information as the asynchronous mode better meets the needs of the latter (Bernard et al., 2004). This rather traditional but still practical choice is actually taken by many of the traditional distance learning programs in higher education, such with the case of Tamagawa University (specializing in education, teacher training, and certificates, n.d.), and Nihon Women’s University (specializing in domestic science and certificates, 2007), with a combination of the face-to-face components (“schooling”) and on-site examinations (Knowledge Station, n.d.), though there are cases that offer real-time television conferencing such as Chuo University (specializing in law, 2006) and Nihon University (covering a wide range of disciplines, 2005).

In truth, the factor of learner preference may actually be the most crucial in distance learning because, however instructional designers and educators at a distance plan their courses to fit learning theories, whether a program/course is finally chosen and enrolled in by a specific learner is completely dependent on factors other than instructional effectiveness, such as work time schedule and ease of receiving the course materials. It is possible that rather archaic course delivery modes such as the combination of one-way paper reading materials + one-way paper submission + one-way tutor feedback on grading, which would be regarded as a predominantly knowledge transmission and delayed feedback model, could be chosen by the majority of distance learners in our digital era simply because it
requires the least time and place commitment from both distance education and learners.

3. Conclusions

Thanks to the growing availability of digital technologies as well as the ever-blurring distinction between face-to-face and distance learning (Bates, 2005; Bates & Poole, 2003), the issue of transmission vs. construction of knowledge may now be becoming a variable to be planned and chosen in a given instructional context. This coincides with the new learning paradigm by Ertmer and Newby (1993) we saw in Section 1.3, where all the major stances towards knowledge and learning – behaviorism, cognitivism, and constructivism – are now considered to be a matter of levels that could happen concurrently.

How imminently the paradigm shift is felt by each researcher and practitioner may depend on what type of thought structure he/she has developed. That is, those who are more familiar with more traditional way of knowing and learning may admit a higher validity to the existing paradigms whereas those brought up in the digital environment may identify more with the new knowledge paradigms such as Connectivism and Navigationism. As we saw, the threshold between before and after is 1982 (Oblinger & Oblinger, 2005). This leads us to another discussion if the newer generation of the digital era actually functions in a different way than former generations (Prensky, 2001a; 2001b). To answer this question would demand independent research where recent findings from neuroscience (Siemens, 2007) and many other fields of study that have been revealing what is happening inside our brains is included.

Finally, we may have to be wary that our notion of technology does not be lead to our thinking that the potential of technology will bring the best learning strategies for anyone anywhere anytime, as this sort of preconception itself may lead to another fixed conception that one paradigm should fit all in all learning environments.

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