



Limitations of the Community of Inquiry Framework

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Abstract: The Community of Inquiry (CoI) framework is critiqued by examining differing assumptions of reality between the objectivist-rational and social constructivist paradigms. The conclusion is that most CoI research emerges from an objectivist-rational paradigm, not a social constructivist one. As a result, the framework's underlying premise that sustained, contiguous communication is necessary for effective learning to occur is called into question. This needs to be empirically tested. Implications for CoI research carried out to date and directions for future research are suggested. The types of questions that could be pursued in CoI research have been inadvertently limited by unchallenged assumptions that may mistake predominant online higher education practice for preferred. Overall, the value of the CoI framework as an adequate explanatory model for learning in online higher education needs to be more critically examined.

Keywords: Community of Inquiry (CoI) framework; CoI survey; higher education; online learning; social constructivist paradigm; objectivist-rational paradigm

Résumé : Les différences entre les conceptions de la réalité selon les paradigmes objectiviste-rationnel et socioconstructiviste peuvent amener à critiquer le cadre de travail de la Communauté d'apprentissage comme Community of Inquiry (CoI). La conclusion est que la plupart des recherches sur les CoI émergent d'un paradigme objectiviste-rationnel, et non d'un paradigme socioconstructiviste. Par conséquent, la prémisse selon laquelle une communication soutenue et contiguë est nécessaire pour qu'un apprentissage efficace ait lieu dans le cadre de la CoI est remise en cause. Cette prémisse doit être vérifiée de façon empirique. Des implications de ce constat pour la recherche sur la CoI effectuée jusqu'à présent et les orientations pour la recherche à venir sont esquissées. Les types de questions qui pourraient être étudiées dans le cadre de la recherche sur les CoI ont été limités par inadvertance en raison d'hypothèses non contestées qui pourraient confondre la pratique prédominante de l'enseignement supérieur en ligne avec la pratique privilégiée. Dans l'ensemble, la valeur du cadre de la CoI en tant que modèle explicatif adéquat pour l'apprentissage dans l'enseignement supérieur en ligne doit être examinée de manière plus critique.

Mots-clés : Cadre de la communauté d'apprentissage ou Community of Inquiry (CoI) ; enquête sur la CoI ; enseignement supérieur ; apprentissage en ligne ; paradigme socioconstructiviste ; paradigme objectiviste-rationnel.



Introduction

Annand (2011) reviewed many Community of Inquiry (CoI) studies conducted to that point and questioned whether the framework proposed by Garrison, Anderson, and Archer (2000) adequately informed the development of online education theory and practice in higher education. Garrison (2012) responded that Annand's arguments assumed a "traditional distance education approach" informed by behaviourist-cognitivist learning theory. Here, learning objectives, activities, and outcomes are often specified and standardized. The primary educational media are generally highly-structured, text-based instructional materials, though this is evolving with the development of electronic forms of instructional media. Learners can often study independently of their peers at various points in the learning process but communication is often limited to one-on-one, instructor-student interaction and is not continuous throughout the education experience. Collaboration among learners may occur but only to accomplish certain specified learning objectives.

Garrison (*ibid.*) opined that Annand's criticism of the CoI framework was misdirected and conclusions largely inapplicable because the paradigmatic assumptions underlying the CoI framework had not been adequately recognized. He argued that the CoI framework arose from within a "collaborative constructivist" perspective. Here, there is a requirement for sustained, contiguous, two-way, and many-to-many communication throughout a formal higher education learning experience, because meaningful human learning occurs through personal interaction with others. As understanding is negotiated and viewpoints contested, internal thought processes are refined. When prior learning is also integrated into the current experience, "deep and meaningful learning" results.

The purpose of this article is to more carefully explore the assumptions underlying the collaborative constructivist paradigm. These have implications for how research may be designed and conducted, and the generalizability of the findings. Based on this analysis, the main trajectory of CoI research will be outlined and inconsistencies identified. Unchallenged assumptions that limit the applicability of much CoI-related research will be discussed, as well as possible ways forward for the scholarly community.

Paradigmatic Assumptions of the CoI Framework

A paradigm, as Erlandson, Harris, Skipper, and Allen (1993) noted, ". . . provides a way of looking at the world. It exerts influence on a field of study by providing the assumptions, the rules, the direction, and the criteria by which 'normal science' is carried out" (p. 7). This article assumes that there are two major paradigms influencing social science research, herein referred to as the "objectivist-rational" and "social (or collaborative) constructivist" worldviews. These are distinguished by their underlying assumptions about reality.

In the objectivist-rational paradigm, reality is assumed to be singular and knowable. Sense data and logic are the primary means of investigating what constitutes reality. Theories arising within the objectivist-rational paradigm can be tested using standard “scientific method” approaches.

Hypotheses are proposed, measurement devices developed, data gathered and analyzed using techniques like descriptive and inferential statistics, and effects of variations in independent variables on a measurable dependent outcome are determined. Higher education research conducted within the objectivist-rational paradigm often evaluates the effects of independent variables on dependent and measurable outcomes like “success rates” and “learning”, however defined. Results are analyzed and the null hypothesis is accepted or rejected. In this way, results that which we really *believe* to be true can be compared and contrasted to what *is* true (or more correctly, that which has not yet been proven false). Using research conducted within the objectivist-rational paradigm, humans can come to know what is real with relative certainty and to attach causality to conditions.

Constructivism proposes that each person conceives of external reality differently. As Doolittle and Hicks (2003) noted, while reality may exist separate from existence, it can only be known through experience. The mind does not merely understand and remember external, objective knowledge from the sensory data which it receives from an outside world but also significantly interprets these events. Past experiences, values, culture, and individual personality attributes influence what individuals understand. Individuals construct personal worlds based on these interpretations. Human cognition is the process of meaning-making, an iterative and internal process where individuals debate and ponder within themselves what is “correct”. Cognition acts to organize and make sense of individual experience. Though it does not permit a completely accurate representation of reality, some interpretations are deemed more valid than others.

However, constructivism represents somewhat of a dichotomy. *Cognitive* (or individual) constructivism acknowledges the active nature of knowledge acquisition and its adaptive nature. Adaptation permits a learner’s behaviour to be more viable in a particular environment. Cognitive constructivism studies the procedures and means of creating and organizing symbolic representations in the mind — the technical process of building mental models. It lends itself to empirical testing and has extended findings related to working and long-term memory, and neural networks, for instance. Cognitive constructivism maintains that reality exists apart from the individual and is knowable to some extent by the individual. Learning is the process of more accurately internalizing and reconstructing the real world.

Collaborative or social constructivism (Jonassen, Davidson, Collins, Campbell, & Banaan-Haag, 1995) also supports the view that knowledge produces a coherent personal reality that permits successful adaptation to a given external environment. However, it stresses that realities are individual, many, and subjective. Knowledge construction is therefore an essentially social process. Mental models of

knowledge construction within one individual are de-emphasized. Truth is not inside an individual but among members of a group. Individuals negotiate with a larger, relevant community about the underlying purposes and meanings attached to events or ideas. They agree about what reality is primarily through group consensus and meaning-making. Sustained, contiguous communication is necessary for this to occur. Because this deliberation is always conducted in a specific social and cultural context, socially-constructed knowledge is time- and place-dependent. The assumption that realities are subjective and multiple is an essential, distinguishing feature of the collaborative constructivist worldview. This, in turn, shapes approaches to education and appropriate research design for investigating the learning experience. The ramifications are discussed below.

Research in the Social Constructivist Paradigm

Lincoln and Guba (1985) proposed the implications for research conducted within the social (collaborative) constructivist paradigm. They argued:

- a. Since there are multiple understandings of experiences, data may suggest directions of enquiry but not rigidly prescribe technique. Studies are necessarily subjective. Both research strategy and tentative conclusions are revised as new phenomena are observed, and more is learned about a particular situation.
- b. While experiences of participants are unique and individual, it is assumed that intersubjective understandings of others' realities are possible through acts of communication. This communication provides a sense of common understanding among individuals. The study of this meaning-making process is of central importance to social constructivist research.
- c. Chosen values influence what is important to the enquirer (researcher) and, therefore, worthy of study. Values also influence the nature and direction of interactions with the participants. The enquirer determines the important and significant issues for study.
- d. Research in the paradigm deals with a vast web of unique interdependencies. Since human choice informs all actions and these are intertwined, it is difficult to establish cause-and-effect relationships.

All of these assumptions act to restrict the generalizability of research findings in the social constructivist paradigm, particularly over time. Enquirers fundamentally watch, listen, ask, record, and examine. Studied experiences and interrelationships are often "thickly described" through unstructured or semi-structured interviews, for instance. In many cases, transcripts of these interviews are analyzed into small units of information that suggest themselves to the enquirer. These units may be analyzed and grouped into larger categories of meaning. These subjectively-perceived patterns permit the transfer of understandings across social contexts in the form of "working

hypotheses” for other enquirers to consider when they undertake similar detailed, qualitative studies of communities.

Consider now the genesis of the CoI framework. Beginning in latter decades of the 20th century, development of two-way, many-to-many electronic communication technologies enabled sustained discussion among instructors and learners for the first time in online higher education. Garrison, Anderson, and Archer (2001) described how the analysis of computer conference transcripts led to the development of the framework. Based on a synthesis of coded and grouped data, constructs of social, cognitive, and teaching presences were developed. It was proposed that these presences and their interactions produce the online educational experience. At this point, the research appears to follow the normal course of the study of phenomena within the social constructivist paradigm.

However, CoI research has for the most part morphed into quantitative analysis. A CoI survey was developed (Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson, & Swan, 2008). This is an approximately 34-item instrument that collects learners’ perceptions of their online learning experiences. Responses are recorded using a Likert scale. Each item is associated with the teaching, social or cognitive presence. Learner responses are categorized and aggregated accordingly. Researchers now commonly quantify the influences of the three presences on each other, and dependent variables like perceived and actual learning (Hilliard & Stewart, 2019; Yussiff, Ahmad, & Mustapha, 2018; Rockinson-Szapkiw, Wendt, Whighting, & Nisbet, 2016; Kim, Park, & Cozart, 2014; Shea & Bidjerano, 2010; Shea & Bidjerano, 2008; Ho & Swan, 2007). Stenbom (2018) listed examples of many statistical and other quantitative methods used to analyze CoI survey data, ranging from non-parametric tests in smaller studies to inferential techniques like multiple regression and structural equation modelling on larger data sets (e.g., Kozan, 2016).

The problem with the use of these techniques in CoI research is that collaboratively-constructed realities are assumed to be fluid, interpreted, and unmeasurable in the usual scientific sense. Working hypotheses may be proposed to inform subsequent, similar qualitative studies of communities but these are not appropriately explored through the use of aggregated, quantified data gathered from surveys, questionnaires, or short, one-time interviews (Eastmond, 1995).

Thus, the first objection to the CoI framework as a vehicle for studying online learning is its conflation of paradigmatic assumptions and research methods. Research designs and analytic techniques that investigate correlations and cause-and-effect relationships among independent and dependent variables are not logically compatible with the means by which research may be conducted within the social constructivist paradigm. Measured against this process, much CoI research to date is inapplicable. This apparent contradiction needs to be more clearly explained by proponents to strengthen the framework’s theoretical base and inform appropriate future research methods.

On the other hand, there is a more reasonable interpretation of the current state of CoI research. This and resulting implications are discussed below.

The CoI Framework Within an Objectivist-Rational Paradigm

Much current research, particularly that which employs the CoI survey, appears to proceed from an underlying conception of reality that is objective and knowable – in other words, the objectivist-rational paradigm. Even in the objectivist-rational paradigm, transcript analysis is a common means of theory development (Corbin & Strauss, 1990). Collected data are reviewed and coded into concepts, then into progressively more general categories of meaning. Hypotheses about relationships among categories are developed as the analysis proceeds and new data is obtained. From these concepts, more abstract categories of meaning are developed according to the common properties, interactions, and consequences of the observed phenomena. These are constantly revised during the study as it progresses. Thus, new theory arises that is “grounded” in the data. The constant comparative method of qualitative analysis (Glaser, 1965; Kolb, 2012) was proposed as a means to both generate general theory by establishing broad categories of meaning within data as qualitative research proceeds, but also to enable the conversion of qualitative data into quantitative measures to promote hypothesis testing via standard scientific processes like inferential statistics.

This process seems to more accurately describe the genesis and evolution of the CoI framework and related research. Analysis and coding of computer conference transcripts led to the original proposition that teaching, cognitive, and social presences reasonably represent the online higher education experience. The development of the CoI survey became the practical means to evaluate relative importance and influences of these presences. Eventually, research made explicit the transformation of the CoI framework from one in which the three presences influence and interact to create the online learning experience to one in which causality is proposed. For instance, Shea and Bidjerano (2010) hypothesized that teaching and social presences causally affect cognitive presence. Quantitative analysis of relative effects of these presences on dependent variables like actual or perceived learning outcomes have also been conducted.

As a result, it does not appear reasonable to argue that CoI research proceeds from a social constructivist perspective. Initial theory development of the CoI framework and subsequent reliance on the CoI survey as a research tool for much quantitative analysis can be seen as logical developments within an objectivist-rational paradigm. If this is true, there are several implications.

- a. Garrison (2017) specifically rejects the assumption that deep and meaningful learning can occur in the absence of sustained acts of communication. He reiterated that the CoI framework operates under the basic premise that learning takes place in a collaborative constructionist framework. But if this premise is wrong, sustained communication throughout a course of

studies may not be a sufficient nor even necessary feature of deep and meaningful adult online learning. Other learning theories need to be considered.

The means to actively facilitate self-directedness and the related attributes of autonomy and independence inform many conceptions of adult and life-long education. Though Knowles (1983) did not agree that adult learning was essentially the transmission of knowledge by effective teaching practices, he did view the process as an internal activity that engages the learner's emotional, intellectual, and physiological being. Adults make use of relevant resources – including instructors, learning material, *and* collaborative learning activities – to the extent that these contribute to the achievement of goals that fundamentally exhibit self-directed learning. When many-to-many communication facilitates this, adult learners find value in collaborative activities.

However, related studies have reported that adult online learners often have less time and desire for social connections with peers and instructors. They prioritize instructor modelling over group interaction, even when faced with complex design tasks (Makri, Papanikolaou, Tsakiri, & Karkanis, 2014; Mathieson & Leafman, 2014). Cho, Kim, and Choi (2017) found that internally-generated self-regulation plays an important role in achieving higher measures of outcomes related to adult learners' task-specific attitudes and self-efficacy beliefs. Such desirable learner traits do not depend on sustained dialogue throughout the learning process and are not able to be considered in within the current parameters of the CoI framework. Whether these traits translate into greater instances of deep and meaningful learning needs to be investigated. But the possibility supports the suggestion that the need for sustained communication cannot be merely assumed in the objectivist-rational paradigm. It must be tested using research designs that measure deep and meaningful learning outcomes in both collaborative and independent learning situations.

- b. Better, more objective measures of deep and meaningful learning are needed that are independent of learning design (Yussiff, Ahmad, & Mustapha, *op. cit.*). Many purported measures of such learning like final grades are influenced by uncontrolled factors. Also, much of CoI research design measures learner perceptions of their educational experiences. Stenbom (*op. cit.*) suggested data that relies on learner self-reporting needs to be replaced by or supplemented with other, more objective measures. Maddrell, Morrison, and Watson (2017) noted the lack of correlation in their study between actual outcomes and student perceptions of the learning experience and stated, "The present study is consistent with prior research that suggested students' self-reports of learning are not substitutes for objective measures of achievement." (p. 253).
- c. The pre-eminent role of collaboration and sustained interpersonal communication in the learning process may have underemphasized the role of teaching presence in CoI research,

particularly the role of instructional material. As Ziao (2017) noted, learner-content interaction is interpersonal communication, if asymmetrical. It constitutes a communicative act between instructor and learner. Zimmerman (2012) noted that very few studies to that point focussed sufficiently on the role of learner-content interaction. This type of interaction appears to have been replaced by a focus on learner-learner interactions.

There seems to be adequate evidence even within CoI-based research to suggest that strong guidance (“scaffolding techniques”) helps novices and intermediate learners to understand a particular task or concept and so decrease cognitive load on short-term memory. Gradually, as more complex thinking skills are acquired, a coherent knowledge structure within long-term memory gives meaning to experience. These processes proceed from behavioural-cognitive learning theories that are in turn rooted in the objectivist-rational paradigm. Consequently, the role and relative importance of these techniques and the related effects of well-designed learning materials on learning outcomes need to be more clearly delineated within CoI research through controlled studies. It may be that original CoI analysis of computer conference transcripts focussed too narrowly on discussion activity and not adequately on other, more important components of the learning experience, like instructional material or one-on-one instructor-student interactions.

Granted, there are issues with both traditional distance-based and on-campus lecture formats that emphasize excess content coverage at the expense of critical thinking development. However, even collaborative learning designs can encourage one-way knowledge transmission and surface learning. Prior CoI research has indicated that rather than promoting discourse and knowledge construction, asynchronous online discussions often failed to move beyond information sharing (Gunawardena, Lowe, & Anderson, 1997; Kanuka, Rourke, & Laflamme, 2007).

One reason proposed for this is that the higher education learning environment is generally characterized by the presence of one expert and many novices, particularly at the undergraduate level. Shared competence is often absent, and peer-to-peer learning can be viewed by learners as inferior to instructor-learner interactions (Miller, Hahs-Vaughn, & Zygouris-Coe, 2014). Breizek (2016) further suggested that an isolated individual may progress through the framework’s proposed phases of cognitive presence – triggering event, exploration, integration, resolution – without the need for sustained discourse. As a result, there is no need to emphasize social and dialogical aspects of thinking (p. 9). Overall, there is some doubt expressed in the literature that online discussions often fulfill their intended purpose regardless of how these are structured. As a result, it cannot be assumed that providing time and means for learners to critique and explore ideas requires the social construction of knowledge.

Garrison (2017) responded that better-designed discussions with clear expectations of outcomes, and facilitation that moves discussions forward might create better resolution and promote higher-order critical thinking. But even when development of critical thinking skills or analysis of differing points of view are considered necessary to the learning process, alternate instructional designs may suffice in place of sustained, many-to-many electronic conversations. Shea (2010) proposed that integrative papers and projects could be a better means to promote critical thinking. Limited, specified group-based collaboration may be able to uniquely develop certain, specified interpersonal skills like the ability to interact with multiple learners, manage group dynamics, and have personal views challenged.

The essential, unanswered question remains whether learners can experience deep and meaningful learning without sustained collaboration among peers. Better research designs are needed to determine the relative importance of instructors, instructional material, and interpersonal communication in the online learning process. Control and experimental groups should be established according to whether continuous, collaborative activity is present and facilitated. Pre-and post-testing and random assignment of participants should be employed and relative performance measured according to an adequate measure of deep and meaningful learning.

- d. More research is needed to determine the effects of different knowledge domains on collaborative learning. It may be that areas with well-established theory or that are quantitatively-based have little need for collaboration to promote deep and meaningful learning. Garrison (2017) noted that the effects of direct instruction on cognitive presence in “pure” disciplines was particularly needful, as well as the effects of inductive reasoning employed in various disciplines (p. 166). This could account for the less-important role of social presence compared to teaching and cognitive presences found in various CoI studies to date.

Arbaugh, Bangert, and Cleveland-Innes (2010) also suggested that the CoI framework might be better suited to “soft” disciplines rather than “hard” ones, particularly at advanced levels. In hard disciplines, theory is well established and accepted, more emphasis is placed on knowledge acquisition, and teaching is often more directive than facilitative. Disciplines relying on well-established and empirically supported theory may require less *resolution* activity, for instance, since outcomes are robustly predicted. It may be that the conceptualization of higher-order subcategories of cognitive presence within the CoI framework (such as integration and resolution) is too restricted because it focusses inordinately on these attributes and downplays other valid constructs. Critical thinking might be developed within any appropriately-structured learning environment without the need for sustained dialogue. Again, comparative studies are needed that use more objective dependent variables.

There are other weaknesses within the CoI framework that need to be addressed. Stenbom (*op. cit.*) concluded that the CoI survey needs to be critiqued by a wider range of scholars and be less dependent on well-cited publications authored by a relatively small group of researchers. Larger and longitudinal studies also need to be conducted outside the context of US graduate-level courses. Results showing pronounced effects need to be replicated in more diverse online learning environments.

All of these criticisms should impact how future research is conducted within the CoI framework. But perhaps the framework's most significant problem is its unstated and limiting effects on the organization of online higher education. These effects are discussed below.

The CoI Framework and Organizational Form

The underlying supposition of the CoI framework is that sustained communication is needed to support meaningful learning. This invariably implies that formal online higher learning needs to take place in a classroom environment where students start at the same point and proceed through the learning experience in relative unison. Sustained discussion and collaboration seem almost impossible if groups of learners do not proceed in a rather lock-step progression through a formal course of studies.

This model of higher education does not seem problematic to most educators perhaps because it now predominates in both the virtual and physical higher education realms. With the advent of many-to-many communication technologies and the entry of virtually all higher education institutions into online learning, 'electronic classrooms' emerged as the predominant educational form. These challenged more traditional distance education forms predicated upon concepts of learner independence, flexibility, and autonomy. Electronic communication technologies also enabled bricks-and-mortar higher education institutions to economically expand their base of learners in response to increased demand for online learning without significantly altering their fundamental educational model of paced, cohort-based learning.

Perhaps this is the reason that Garrison (2017) cited an "emerging consensus" among educators that more active and collaborative learning is needed to develop critical thinkers, and that a previously individualistic culture in higher education is evolving to one that better understands the value of collective learning and knowledge. Formal online learning is not a radical transformation of the educative process but rather a return to a traditional view of learning as a process of collaborative inquiry and discourse among a relatively small group of participants. This counters the individualistic, isolationist approaches that have evolved in higher education over the last several decades because of societal needs for expanded access to learning opportunities and greater delivery efficiencies, he opined. In bricks-and-mortar campuses, this was epitomized by lecture-based

education models; in traditional distance education, by correspondence study. In contrast, the educational model underlying the CoI framework represents a return to a craft model of education. Garrison (2017) acknowledges and welcomes this.

The problem is that the craft model propagates a long-standing, inefficient form of adult education (Annand, 2007). One human teacher is still required to oversee and shepherd a rather limited number of learners. It ignores the fact that societal demands for greater access to higher education, including that for non-traditional learners, has been accompanied by marked fiscal constraints. The higher financial costs associated with a return to a craft model of higher education, either in the physical or virtual realms, limits its feasibility into the foreseeable future. As a consequence, this generally unquestioned acceptance of the electronic classroom as the preferred form of higher education limits consideration of, and evolution to, scalable yet effective higher education models. The growing capabilities of artificial intelligence and other technological innovations, coupled with continued funding constraints, will likely make these small, localized forms of instructor-learner communication even more expensive and impractical relative to other models.

If the necessity for sustained, many-to-many communication to achieve deep and meaningful learning is tested and discarded, alternative conceptions of the practice of online higher education are possible. Questions of relative efficiency and effectiveness of learning design can be considered, like coupling the effects of unpaced learning with just-in-time peer-to-peer or learner-instructor interactions. Time and cost constraints can be included in analyses to determine if instructor and learner efforts could be better spent on other types of educational activities, rather than a concerted focus on many-to-many conversations embedded in the CoI framework. All of this argues for a broader, more robust approach to the study of online learning than currently provided by the CoI framework.

Conclusion

Anderson and Dron (2011) classified online learning into three eras: cognitive-behaviourist, social constructivist, and connectivist. They pointed out that technologies have defined how online education is conducted. The influence of technology has in turn informed underlying theory in each era. Theories channel thinking and sometimes, important facts are overlooked. This seems to have occurred in the case of the CoI framework, which arose concurrently with the advent of many-to-many electronic communication technologies. Its central assumption still needs to be critically examined – whether sustained, contiguous two-way communication is necessary to produce deep and meaningful learning. To this point the assumption has rarely been challenged in the literature.

In the largest sense, the criticism of the CoI framework herein rests on whether the description of differences between the objectivist-rational and social (collaborative) constructivist paradigms is

accurate, particularly regarding each paradigm's mutually-exclusive assumptions about the underlying nature of reality. If reality is socially constructed, the tenets of the CoI framework appear reasonable, particularly the need for sustained dialogue in the higher education learning environment. However, by the same token it is then difficult to defend the use of quantitatively-based studies characteristic of much CoI research to date.

Garrison (2012) argued that quantitative analysis was complementary to the original qualitative research that gave rise to the CoI framework. However, this does not seem consistent with the tenets of social constructivism. The use of the CoI survey as a main research tool, the employment of mathematical techniques to quantify influences of the three CoI presences, and the assignment of correlation and causality to dependent variables strongly suggest that much of CoI research rests on assumptions about reality inherent in the objectivist-rational paradigm.

If this is so, the need for sustained communication in the educative process cannot be assumed. It must be tested using standard comparative research designs that evaluate effects on an appropriate, objective measure of deep and meaningful learning. To this end, more reliable representations of such learning need to be developed that are independent of instructional design.

When all desired educational outcomes are considered, the requirement for sustained, contiguous, two-way communication throughout the formal higher learning process may be unnecessary and inefficient, particularly for novice and intermediate learners. Appropriately structured learning materials, intermittent and intentional group collaboration, timely one-on-one or one-to-many instructor-learner interaction, and new forms of artificial intelligence may be the best prescriptions for most instances of effective and efficient online higher education. More appropriate research design is needed to test these suppositions.

Garrison (2017) stated that all ideas must be seen as transitory, either in process of being improved or proven wrong. This article has delineated several weaknesses with the CoI framework – its unexamined assumption of the need for sustained communication to enable deep and meaningful learning, lack of adequate surrogates for deep and meaningful learning, a narrow focus on cohort-based education based on the experience of most CoI practitioners and researchers, and failure to consider wider societal needs for cost-effective mass education. It may be that the usefulness of the CoI framework has run its course. Completely new theories may be needed so that efficient organizational forms of online higher education can emerge to meet burgeoning world-wide demand. These new models will need to explore the use of artificial intelligence, facilitate more efficient unstructured and learner-prompted interactions, enable instructors to intervene more selectively with participants, give learners more time-flexibility to complete a course of studies, and provide the general means to increase student support with less direct human instructor involvement and

concomitant costs. In doing so, the formal education needs of fully-adult learners will be more adequately met.

Academic debate should be re-focussed on the best means to implement these new possibilities. Unconflated empirical studies need to be conducted to definitively test the efficacy, scalability, and cost-effectiveness of various formal online higher education models. Implicit assumptions about the best methods, media, and educational forms to enable learning in formal online higher education should be consistently challenged.

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