The field of distance education is complex in nature because it is composed of constructs from a variety of academic fields in addition to its own foundational concepts, constructs, and theories. Although research in distance education can be traced back to the 1930s when researchers were examining the effectiveness of educational radio, it is only now that inquiry in distance education is beginning to show the maturity that is required for such a complex and multifaceted phenomenon.

Evidence of this maturity can be found in rigorous quantitative and qualitative methods of inquiry that researchers have begun to apply in their studies in recent years. Simple descriptive articles about how distance education is being implemented in a specific institution have all but disappeared in scholarly journals. In addition, the number of comparative statistical analyses between two methods or modes of instruction (e.g., distance versus face-to-face) or between two media has dramatically decreased. This
method has invariably shown no statistically significant difference between the two experimental treatments studied no matter which two phenomena were being investigated. The fact that no statistically significant difference were observed in almost all of the comparative studies indicated the inadequacy of the comparative method of inquiry in, at least, matters related to distance education.

Understanding the limitations of these types of studies, researchers have pursued the following strategies:

- They have adopted a wider variety of research methods in conducting their inquiries.
- They have embarked on conducting a series of quantitative studies to improve research techniques in distance education, thus making methods of inquiry in the field more appropriate to the questions at hand, as well as more precise and rigorous.
- They have developed a deeper understanding of the relationship between quantitative and qualitative data when more than one method of inquiry was applied in a study. Through triangulation, researchers have increased the level of certainty that the results they obtain will be valid and reliable and not a mere effect of how data was collected, analyzed, or interpreted.

In addition, the application of system dynamics to distance education as a research method provided the means to develop testable models of constructs: It combined qualitative data collected in explicating basic assumptions in modelling a theoretical construct (such as transactional distance made by major stake-holders in an organization or a program) with quantitative data to test the validity and reliability of a model.

**Purpose and Method**

This chapter offers a critical examination of issues regarding methods of research in the field of distance education based on the following three different types of scholarly studies:

(1) Recent quantitative analyses of trends in research and methods of inquiry in the field by Shachar, (2008); Zawacki-Richter, Bäcker, and Vogt, (2009); Gokool-Ramadoo, (2009); Davies, Howell, and Petrie,
(2010); de Oliveira Neto, and dos Santos, (2010); and Ritzhaupt, Stewart, Smith, and Barron, (2010).

(2) Selected individual research articles published in the English language between 2008 and mid-2011 in three leading journals:

a. *The American Journal of Distance Education*, a print publication (http://www.ajde.com/)

b. *The International Review of Research in Open and Distance Learning*, an open access publication (http://www.irrodl.org)

c. *The Journal of Distance Education*, Canada, also an open access publication (http://www.jofde.ca)

(3) Selected studies in application of system dynamics in distance education as a research method.

A critical review of these sources will focus on areas in which:

• progress has been made to adopt and use appropriate methods of inquiry for adding to the knowledge base of the field of distance education

• further work by researchers is needed to establish comprehensive methods of inquiry that would be responsive to myriad constructs in distance education

**AREAS OF PROGRESS**

**Early Signs of Maturity**

The review of literature conducted for this chapter indicated an increase in the volume of research studies published, as well as noticeable improvement in their quality. Scholarship in the field is showing early signs of maturity. Researchers are using phenomenological methods to ascertain if specific constructs are operationally present in distance education.

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1 These journals were chosen for the leadership they have provided to support scholarship and disseminate research results in distance education during the contemporary conceptual growth of the field. The starting point of 2008 was chosen to coincide with the conclusion of the study of Zawacki-Richter, et al. (2009) in order to include selected articles, which were published from then until mid-2011.
programs and systems. Quantitative methods (sometimes mixed with qualitative methods) are also used to:

- reflect on how research is conducted in the field of distance education
- refine new research instruments
- conduct meta-analysis of extant studies
- analyze massive amounts of data that is generated in discussion forums or similar networked environments.

To test the assertion that the volume of research studies has dramatically increased we need only to look at the research being conducted and the contributions to the literature in the field being made by a new cadre of educators in different disciplines who teach courses at a distance, design instructional systems for distance teaching and learning, or manage distance education organizations, systems, and programs—in addition to those scholars who specialize in distance education.

In http://Distance-Educator.com, a website that I established in 1995, and have edited since then to reflect news and information about the field, I have listed 40 scholarly journals that are directly related to the field or a subfield of distance education. In addition, journals that are totally unrelated to distance education and specialize in specific disciplines, such as *Journal of Nursing Education*, have also published respectable studies concerning issues related to distance education. In fact, as the practice of distance education has expanded dramatically in the last 10 years, one may see an article about distance education in the current issue of journals in fields of study that are not associated with distance education at all. A quick search in Google Scholar showed several publications in this category ranging from *Educational Psychology* to *Nature and Science*, just to name two, to illustrate how scholarship about distance education has extended to other fields.

The following table shows a compilation of different research methods used in distance education as gleaned from the review of recent literature in the field, particularly the studies of Shachar (2008); Zawacki-Richter, et al. (2009); Gokool-Ramdo (2009); Davies, et al. (2010); de Oliveira Neto, et al. (2010); and Ritzhaupt, et al. (2010).
Table 5.1 Compilation of different research methods used in distance education.

<table>
<thead>
<tr>
<th>Quantitative</th>
<th>Qualitative</th>
<th>Theoretical/Analytical</th>
<th>Historical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical descriptive, comparative, regression, and factor analysis</td>
<td>Case study</td>
<td>In this line of inquiry several quantitative and/or qualitative methods are mixed depending on the objective of the critical analysis or theory building. In studies that both methods are used, quantitative and qualitative data are often triangulated to examine the reliability and validity of the results, thus adding more rigor to studies.</td>
<td>Historical research generally depends on examination of archived documents, and other similar artifacts in the time period of the study. There is a dearth of historical research in distance education, therefore, methodology in this category in the field is not well articulated yet.</td>
</tr>
<tr>
<td>Meta analysis</td>
<td>Semi structured interviews</td>
<td></td>
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<tr>
<td>Survey</td>
<td>Focus group</td>
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<td>Cost effectiveness</td>
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<tr>
<td>Analysis of online dialog</td>
<td>Analysis of online dialog</td>
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<tr>
<td>Experimental and quasi-experimental</td>
<td>Grounded theory</td>
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<td></td>
<td>Ethnographic study</td>
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<td></td>
<td>Phenomenological analysis</td>
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A Quick Review of the Past

To understand the extent and importance of progress in adopting a wide range of research methods in the last 10 years as shown in the above table, a quick review of recent history is in order. A criticism of the field in the past has been the dearth of scholarly articles that are data-driven and theory-based (Saba, 2000). With the exception of a few articles, literature
about distance education in each periodical before the turn of the century reflected the following:

(1) Descriptions of programs in various institutions with no discernible methodology in developing a descriptive account that indicated their validity or reliability as well as their appropriateness for generalizability. Purely descriptive studies of systems and programs have all but disappeared from the leading journals. However, researchers still continue to present elaborate descriptions of the institutions or settings in which they have conducted their research studies without explaining the direct relationship of the unique characteristics or special features of such settings with the purpose, method, or results of their studies.

(2) General surveys of learners’ attitudes towards a program or a course of study offered by a specific institution. Similar to descriptive studies, results of these surveys were not generalizable to other institutions because the instruments used to collect the data were not standardized nor were they based on basic theoretical constructs of distance education. Researchers continue to use survey studies; however, an increasing number of data collection instruments in recent studies are validated and their results are more reliable and generalizable.

(3) Comparisons of various dimensions of distance education with “traditional” (e.g. face-to-face, brick and mortar, and so on) education, which invariably showed “statistically no significant difference” between the two modalities compared. Recent examples of comparative studies in Donkor, (2010); Ferguson, and DeFelice, (2010); Ward, Peters, and Shelley, (2010); Bassili, (2008); Carter, (2008); and Cragg, Dunning, and Ellis, (2008) used variations of the experimental method (e.g., quasi-experimental or mixed experimental methods with interviewing subjects). These studies confirmed the inadequacy of comparative quantitative studies as they also resulted in no statistically significant difference between the experimental group and the control group of subjects in relation to the experimental variables.
Failure of the Experimental Comparative Method and its Consequences

Use of the quantitative method to compare two modes of education, which was the predominant form of inquiry for many years before the turn of the century, requires further elaboration. Analysis of this method's failure illustrates important points that may pave the way for adopting a systems-dynamic approach to research in distance education, an approach that combines qualitative and quantitative data for understanding complex systems, such as distance education.

Fundamental flaws of the comparative experimental or quasi-experimental methods of inquiry include:

• Distance education is not examined on the basis of its own merits. In contrast, it is looked at in comparison to other forms of education, such as face-to-face classroom instruction, on-campus education, and so forth.

• Modes of education characterized as “traditional,” “face-to-face,” and “brick and mortar” are predominantly craft-oriented and are not designed to follow a standard set of procedures for presenting instruction or managing a program or system; therefore, the constructs that are measured comparatively are not truly comparable.

• The effect of experimental variable(s) on learning or other similar constructs are measured when aggregate quantitative data collected from the control group is compared with that of the experimental group in a research design that leaves out individual differences of group members. It is no surprise that looking for differences where they have been eliminated by the experimental design or the statistical procedure has revealed no significant difference time after time over the last five decades!

• The learner or other subjects are often removed from their normal environment and put in a laboratory condition to control for experimental variables—a practice that can cast doubt on the reliability and validity of research results when they are applied to educational institutions for improving educational practices outside of the laboratory environment.
Data collected reflects a moment in time. Emergent qualities of learners, managers, or other key players over time are not taken into account in studies that take a snapshot of the data that is collected for the study.

**Ascendance of the Qualitative Methods**

The shortcomings of the comparative statistical methods to move research forward shifted the attention of researchers in the field to qualitative forms of inquiry in distance education, as well as in other related fields, such as educational technology. Using qualitative approaches, researchers in distance education have produced exploratory studies that are most appropriate for theory building by identifying new constructs or examining their operational presence in distance education programs. Researchers have succeeded in adopting qualitative methods of inquiry that, unlike descriptive and comparative studies, actually offer new knowledge about which constructs are operational in a distance education system and how such constructs can be analyzed and studied further in future research projects.

Results presented in a new genre of studies, which focussed on trends in research in distance education (Shachar, 2008; Zawacki-Richter, et al. 2009; Gokool-Ramdoo, 2009; Davies, et al., 2010; de Oliveira Neto, et al., 2010; Ritzhaupt, et al., 2010) as well as individual selected research articles for this chapter that were published between 2008 and mid-2011 showed that in the past decade researchers have expanded their use of phenomenological methods. A few examples include the following:

- Scripture (2008) explored the application of problem-based learning for distributed systems.
- Barbour and Hill (2011) focussed on the experiences of Canadian rural students enrolled in virtual schools.
- Dolan (2011) examined the experience of the isolated adjunct online faculty.

These and other similar phenomenological studies expand the theoretical base of distance education if their results are subjected to tests of validity, reliability, and generalizability. In other words, an important source for formulating hypotheses for empirical quantitative studies is the outcome of
qualitative and analytical exploratory inquiry. Qualitative explorations of this kind must lead to formulating new hypotheses that can be tested in experimental studies using methods other than the traditional comparative statistical analysis, which has proven to be of limited use in understanding distance education. An example of an optimal method is the systems dynamic method (described further below), which combines qualitative and quantitative methods to study complex systems while taking into consideration assumptions, viewpoints, and opinions of major players in an organization, such as students, teachers, administrators, policy makers, and other stakeholders.

**Improving Quantitative Methods**

For conducting more refined and complex research projects, scholars have published data-based studies to improve research methods that are essential to the field. Examples of these lines of inquiry include:

- Hill, Song, and West (2009), who focussed on research constructs used in Web-based learning environments
- Oriogun (2009), who conducted a study to validate a new method of analyzing online message transcripts
- Buraphadeja and Dawson (2008), who analyzed models for assessing critical thinking using content analysis of computer-mediated communication
- Zhang, Koehler, and Spatariu (2009), who developed a research instrument consisting of an inventory that measures students’ motivation to engage in critical reasoning in online discussions

Researchers have also demonstrated how quantitative methodologies can harvest and analyze data from a wide range of individual studies in order to glean new information from them. Of particular interest in this line of inquiry are Ritzhaupt, et al. (2010) who presented co-word analysis for examining the increasing volume of research studies in the field, as well as, Shachar (2008) who suggested using meta-analysis, “a collection of systematic techniques for resolving apparent contradictions in research findings” (p. 3) in multiple studies.
Areas That Need Further Improvement

Use of Theory

The critical review conducted for this chapter indicated that very few studies were grounded directly on a particular formal theory of distance education. The use of theory is important to the study of research methods when the appropriateness of a method of inquiry in researching specific constructs in distance education is in question. As explained before, researchers are interested in phenomenological studies to explore and eventually ascertain if specific constructs are operational in distance education systems. This would be either to expand extant theories of distance education or propose new ones. This line of inquiry for theory building is not surprising given the relative youth of distance education as a field of study and its enormous complexity as a field of practice. As Saba (2003, 2007) demonstrated, distance education is a general systems concept with myriad components that affect each other and are affected by each other.

System Dynamics Method of Inquiry

In studying complex phenomena, such as distance education, it is not enough to understand the effect of one variable on another. The researcher must look at the relationships among myriad components that dynamically affect each other and are affected by each other over a period of time. In such systems, one variable could be the cause in a subsystem of a larger system and at the same time be the effect in another subsystem of the same larger system during the same time period. In other words, isolating one system component and studying it separately may shed light on the behaviour of that particular component, but it cannot provide any new knowledge about how that component behaves in relation to other components of a system of which it is a member. Studying experimental variables isolated from the entire system cannot inform us about the behaviour of the entire system as whole.

System dynamics provides a method of inquiry for the researcher to look at the entire operation of a distance education system, such as a single or dual mode institution, or the training department of a corporation that is involved in distance teaching and learning, or any subset of these larger systems. In order to understand distance education as a complex system
of instructors, learners, administrators, instructional designers, as well as many other professionals who work together to facilitate the learners’ learning, system dynamics offers the following affordances:

• It combines qualitative data in the form of assumptions made for the initial states of each system variable with quantitative data collected on how system variables may behave under certain conditions.

• It preserves the integrity of data collected from single subjects that show the effects of the interaction of their individual traits on myriad experimental variables. That is, data points on each subject in such studies are not aggregated to erase the effects, if any, of individual differences among subjects. This is a crucial methodological issue as future distance education systems will become more responsive to the individual interests, needs, and traits of learners by adopting learning systems that can adapt to the learners’ preferences, traits, and prior knowledge.

• It allows for empirical observation of how multiple variables affect each other and are affected by each other over time.

• It provides for observing emergent qualities of system variables over a period of time including learners’ cognition, behaviour, and emotive states; management practices in a system; or other system components.

• It offers the possibility to conduct experiments in normal settings. A laboratory is not required to control for variables that are always present in ordinary conditions for learners, managers, or other players. For a more comprehensive explanation of systems as a method of study in distance education see Saba (2003, 2007).

A hierarchical model of the field presented by Saba (2003) and refined in Saba (in print) depicted the complexity of system variables involved in various nested levels of distance education organizations and programs. These levels range from hardware systems to global systems, each performing a specific role in relation to other levels to make such programs and organizations function.
Figure 5.1 System variables involved in various levels of distance education programs.

Hardware systems are the necessary equipment needed to produce instructional materials, establish and maintain communication between the instructor and learner and among learners. Professionals who work in this system level are engineers and technicians who design, install, and repair different hardware components.

Software systems consist of the array of computer programs needed to convey instructional messages to students or to maintain synchronous communication between instructor and learner and among students. These systems range from e-mail to more complex programs such as Web-based video conferencing systems (e.g., Adobe Connect, Blackboard Collaborate), learning and content management systems (e.g., Moodle, Blackboard, WordPress, and so on) as well as student information management systems (SIMS), and customer relation management (CRM) applications. Professionals who work at this level are software engineers, programmers, videographers, audio engineers, graphic artists, as well as writers, editors, typesetters, proofreaders, and many others in similar professions.
Telecommunication systems are necessary to connect the instructor with learners and to provide connection among learners. A variety of such systems are used today in distance education that range from broadcast and cable television to telecommunications satellites and the Internet.

Instructional systems are courses, modules, learning objects, and supporting elements, such as databases, that include the instructional strategy and content for each subject, knowledge domain, skill set, and competency taught and learned. Professionals who work at this system level are instructors, instructional designers, subject matter experts (SMEs), and evaluators. They work closely with those who are in the software systems to produce instructional materials. As complex adaptive learning systems will emerge and provide for personalized learning, the learner may also be added to the list of such professionals since many decisions previously predetermined by instructional systems will be made by the learner dynamically as the learning process progresses over time.

Educational systems represent a collection of courses that form a discipline, usually placed in an academic department or the training division of corporations or government agencies. Professionals at this system level consist of school principals, department chairs, training managers, chief learning officers, academic deans, and vice presidents of human resource development or academic affairs officers.

Societal systems consist of individuals who work in government agencies or private organizations that create the legal and financial basis for distance education to function. Laws governing accreditation, telecommunication, copyright, and public and private allocation of funding to distance education are outputs of this system level. Professionals in this level include legislators, lobbyists, government agency administrators, regulators and rule makers, attorneys, grant administrators in the public and the private sector, as well as members of state and national distance education associations.

Global systems consist of a network of institutions and international associations that make distance education viable throughout the world. Professionals at this level include officers and members of international bodies such as the World Bank, UNESCO, International Council for Open and Distance Education, European Distance and e-Learning Network and similar organizations that support projects and hold conferences and meetings in different countries of the world.
Research in Each System Level

One of the major characteristics of hierarchical complex systems is that each higher level subsumes the lower levels and is affected by the higher levels, directly or indirectly. For example, an increase in the level of regulations at the societal system level affects how instruction may be designed at the instructional and software system levels. Exploratory phenomenological research has primarily focussed on the following areas:

- Role or characteristics of learners and professionals, such as instructors; components that are generally related to the instructional systems level
- Variables, such as, motivation, satisfaction, retention, and so on, that are involved in the instructional systems level
- Roles or characteristics of systems manager in the educational system level.

Research in the field has, therefore, concentrated on instructional or educational systems levels and has not considered other levels that are very much part of the normal practice of distance education. This observation raises the following questions:

- Has distance education theory been articulated optimally to include the myriad constructs in which researchers are interested? An example is the extent to which theories of distance education have been examined in terms of emerging learning theory of connectivism. Bell (2011) suggested that connectivism is a learning theory for the digital age and presented a comprehensive analysis of its application in theory-driven research. Another example is the extent to which the relationship of established methods of teaching and learning, such as problem-based learning, to distance education theory has been examined.

- To what extent should methods of research in distance education be directly derived from the extant or emerging comprehensive theories of distance education? For example, Gokool-Ramdoo (2009) extended the application of transactional distance theory to develop an evidence-based model of policy analysis and development. Also, Boitshwarelo, (2011) suggested design research as a method
to understand social networked learning as a construct in the comprehensive emerging theory of connectivism.

• As the practice of distance teaching has gained more popularity in various fields of sciences and humanities, to what extent will teachers and scholars who are in disciplines other than distance education influence the future theory building and selection of research methodologies in the field of distance education? Such theories and methods may be derived from the particular fields of instructors, such as engineering, literature or nursing, to name a few, and not necessarily from distance education.

• To what extent are teachers and scholars who are in disciplines other than distance education aware of the theoretical foundations and research methodologies of the field?

This last question is particularly important in the sense that it can significantly impact the methods and types of inquiry in the field in the future. Therefore, it needs further elaboration here. Over the long history of the practice of distance education until recent years, researchers who focussed on distance education also specialized in the field as their primary academic discipline, or came from disciplines and practices, such as educational technology or extended and adult education that were closely affiliated with distance education. As we move into the second decade of the current century, the review of literature conducted for this study made it clear that many other professionals have joined the ranks of distance education scholars who conduct research in the field. These professionals include:

• instructors who are engaged in teaching at a distance in a variety of subjects other than distance education

• instructional designers who design distance education courses and programs for many subjects areas

• administrators of organizations in K–12 or higher education who are actively engaged in managing distance education systems and programs.

These professionals are posing legitimate questions in their studies to add to the knowledge base of the field because such questions may pertain to their particular interests as practitioners who teach, manage systems, or
design instruction for distance learning and teaching. Questions they pose may range from adoption of certain hardware and software systems, to cultural considerations, among myriad other issues that practitioners may face during a typical day. While this is a welcome development for adding to the knowledge base of the field, very few researchers who do not focus on distance education as their primary area of scholarship seem to be aware of the history, theory, and literature of distance education as lack of reference to the established literature of the field in their articles indicate. The majority of the articles written by this group of professionals examine theoretical constructs in their own primary area of study. Left out of their consideration are the theories and constructs that are native to the field of distance education. Since there will always be many more researchers who do not specialize in distance education as compared to those who select the field as the primary area of their scholarship, the emergence of this cadre of researchers will have far-reaching effects on the future direction of scholarship in distance education if they continue to ignore the literature of the field in the coming years.

The field requires a set of commonly agreed upon theories, principles, constructs, and rules to guide research projects. At this point, studies that highlight the common background of the field of distance education are lacking. An important example of this type of study is historical research. As Moore (2008) indicated, a dearth of studies in how the field has developed historically is lamentable in itself. However, lack of such studies have also led to the current conceptual confusion in the field—a problem that has become one of the most challenging methodological issues in research in distance education. For example, it is not always clear if researchers refer to seemingly the same referents with different names, such as Web-based learning, online learning, eLearning, and so on. Therefore, a core set of commonly agreed upon constructs is lacking today to move research in distance education to its next level of development.

**FOUNDATIONAL CONCEPTS**

Moore, Dickson-Deane, and Galyen (2010) conducted a survey study in which respondents were asked to define selected terms, such as, *distance education*, *e-learning* and *online learning* and describe their attributes. The
study confirmed “conflicting responses,” as well as “great differences” about the meaning of these terms. The study concluded that such lack of common understanding of foundational concepts has implications for classifying research results and collaborating among scholars internationally.

Guri-Rosenblit and Gros (2011) conducted a thorough analysis of the term e-learning and its different connotations in the literature. Their study concluded that e-learning is a confusing term given that the current technologies vary greatly in their abilities and affordances. It does not seem possible, at this stage, to aggregate technologies into one term that is used by all practitioners and researchers in this field, as e-learning may include a range of technologies in which electrons are active, from the telephone to satellites and the Internet. In another study Guri-Rosenblit (2009) demonstrated that authors have fundamental misconceptions about how distance education is defined, and why e-learning can be a subset of distance education, but it cannot supplant it as a research construct.

**Construct Validity**

Currently, very few studies attempt to verify experimentally the validity of concepts, such as e-learning or online learning, similar to the study conducted by Saba & Shearer (1994) to verify the validity of the concept of distance in education by experimentally examining the theory of transactional distance. As Moore (1993) posited and Saba & Shearer (1994) experimentally demonstrated, distance in education or transactional distance is determined by the dynamic interplay of key variables of structure and dialogue as these variables can be measured in the frequency of certain utterances of speech acts of the learner and the instructor. In other words, while physical distance between the learner and the instructor can be determined in miles or kilometers, speech acts as well as other units of measurement, such as indicators of social presence, determine psychological and social distance in education. As it was tentatively demonstrated in a systems dynamic model (Saba & Shearer 1994), when structure increases—as measured by speech acts attributed to the instructor or the instructional agency (e.g., the university)—transactional distance increases. Also, as dialogue measured by speech acts attributed to the learner increases, structure and transactional distance decrease. Further, since structure and dialogue are highly dependent on the individual characteristics of the learner, transactional
distance may differ greatly in each moment of instruction for each individual learner (Saba 2003, 2007). As embryonic as this Saba & Shearer’s study of 1994 was and as tentative its findings remain to be, similar demonstrations of verification and establishment of validity is necessary for terms, such as e-learning or online learning, if they are to be taken as serious theoretical constructs.

A more recent example of such an analysis is the discussion of the concept of openness presented by Wiley and Hilton (2009). The authors in this article analyzed the concept of openness by specifying its dimensions as compared to the predominantly closed systems of the brick and mortar higher education. This analytical article needs to be augmented with a method of measuring the openness of educational institutions to determine their openness quotient.

**SUMMARY AND CONCLUSION**

In the last few years, researchers in distance education have favoured the use of phenomenological methods of inquiry to explore constructs that may be operational in distance education systems. Such exploratory studies, however, must be augmented with quantitative data-based and theory-driven studies to verify the validity of constructs and concepts that have surfaced in these studies. Also, triangulating quantitative and qualitative data offers a method to make the validation of constructs, as well as determining the extent of the effect of experimental variables, a more rigorous process.

Systems dynamic, which combines the use of qualitative and quantitative data, offers an optimal means of studying complex systems, such as distance education. Applying this research method is lacking in the field to study the effect of myriad constructs (or system components) on each other as time progresses in an instructional session or in an organization as a whole. Research studies using single subjects is also possible when systems dynamic is used, without compromising the data points of each subject by aggregating them. For example, the concept of e-learning and online learning must be subjected to the same systems analysis as the concept of transactional distance was in Saba and Shearer (1994).
References


