Acknowledgements
This work would not have been possible without the enthusiastic contributions of Structured Dialogic Design pioneers around the globe and especially those collaborating with the Institute for 21st Century Agoras: Kevin Dye, Ken Bausch, Roy Smith, Tom Flanagan, Peter Jones, Norma Romm, Janet McIntyre and Larry Fergeson. The examples cited were made possible through a United Nations Development Program (UNDP; “Building a multi-ethnic and multi-national Cyprus to promote European values and regional and international peace”) and a European initiative (“Uniting for citizenship and participation: Youth promoting vulnerable groups’ rights, opportunities, and knowledge”) given to the Future Worlds Center. The authors would also like to thank the coordinators of the projects mentioned here; Mr. Larry Fergeson and Mrs. Kerstin Wittig; the participants of the co-laboratories for all their constructive suggestions; and also CWA Ltd. for providing their proprietary software Cogniscope™ for use in all co-laboratories.

Abstract
The science of Structured Dialogic Design (SDD) is embedded within emerging technologies to develop a new, scientifically grounded methodology in online distance education. The chapter begins with an introduction of the SDD process. It then discusses current applications of wikis in educational contexts and their shortcomings. Examples in which the SDD was embedded within emerging technologies and wikis
in particular are used to draw attention to the benefits introduced by the application of SDD as a tool to structure the learning process and facilitate commitment, endurance, and intentionality of learning.

Introduction

Contrary to common belief, most learning does not take place in formal settings. Schooling is an invention of the last centuries, whereas learning existed long before evolution presented Homo sapiens (Laouris & Eteokleous, 2005). Learning takes place at all times because we carry the necessary equipment in our skull; we can compare on-going stimuli, experiences, and judgments with existing schemata and assimilate them as new knowledge (Duncan, 1995; Laouris, 1998a, 2004a, 2005; Laouris & Eteokleous, 2005). Moreover, learning takes place without our conscious realization because the brain can process, evaluate, and organize information asynchronously at the time of the input. Information technology and the Internet, in connection with the exponential proliferation of mobile telecommunications technologies, have taken the learning process outside of school walls, providing access to knowledge to people from all walks of life (Laouris & Laouri, 2008). Such technologies have created new venues for learning to take place anytime, anywhere. Technology improves connectivity among learners, including between management, parents, and students, as well as future generations. Furthermore, new and emerging technologies impact pedagogy and teaching and learning processes (see chapters 1, 2, 5, 6). For example, emerging technologies have irreversibly shifted the balance from teacher-centred towards learner-centred education (chapter 5). Educational systems and pedagogical theories are continuously evolving (chapter 2) and are increasingly integrating state-of-the-art technologies, transforming “distance education.” Immersed within technology-rich environments, learners and educators may communicate at all times synchronously and asynchronously. This imposes new requirements for learning theories, pedagogy, and andragogy (chapter 2; Knowles, 1984). Prior to educators having time to adapt to technological changes, the appearance of Web 2.0 tools has created strong turbulence. Wikis, blogs, podcasts, talking characters, and virtual environments
with 3-D avatars “living” almost normal lives present new challenges to educators. The plethora of tools, in conjunction with conjectures and disputes concerning their effectiveness and educational relevance, introduce a new “state of affairs”: the emergence of a mosaic of independent approaches and technologies to access an unstructured and almost chaotic body of content and knowledge (chapters 2, 5).

It is within this context that our team focuses its efforts in the development and application of methodologies that can adequately address the above state of affairs. Over the last five years, our global team has collaborated to facilitate a marriage between the openness and freedom of Web 2.0 tools and the structure and discipline that education requires (Christakis & Underwood, 2008; Laouris & Christakis, 2007). In the next sections we (a) introduce the reader to the science of Structured Dialogic Design, which serves as the scientific grounding of a new approach to education that has recently been implemented in distance education contexts, (b) review contemporary approaches that educators use to integrate wikis in their educational settings, and (c) discuss example applications of the Structured Dialogic Design process embedded into a particular Web 2.0 tool, specifically the wiki.

A Short Introduction to the Science of Structured Dialogic Design

The Structured Dialogic Design (SDD) process is a self-documenting and strictly structured method of disciplined and democratic dialogue between people. The SDD is scientifically grounded on seven laws of complex systems science and cybernetics (see Laouris, Laouri, & Christakis, 2008, p. 340). A typical SDD co-laboratory is specifically designed to assist heterogeneous groups of individuals to deal with complex issues in a reasonably limited amount of time (Banathy, 1996; Christakis, 1996; Warfield, 1994; Warfield & Cardenas, 1994). It enables the integration of contributions from learners or stakeholders with divergent prior knowledge and with diverse backgrounds and perspectives. This integration is achieved through a process that is structured, inclusive, and collaborative.
The need for a scientific methodology to facilitate democratic dialogue was first envisioned by systems thinkers in the Club of Rome (Özbekhan, 1969, 1970). SDD was systematically refined through years to its current 4th-generation version, which has a much wider applicability. (The interested reader can refer to the complete review of the methodology by Christakis and Bausch (2006) for more details.) Laouris & Christakis (2007) reviewed the first four applications of the 4th-generation SDD (referred to as “hybrid”) that were implemented in the context of a rich web-based communication environment using a combination of asynchronous and synchronous communication tools. The term “hybrid” is used to describe the fact that the SDD process is implemented using (a) a combination of face-to-face and virtual communication technologies, and (b) a combination of synchronous (which can be either face-to-face or virtual) and asynchronous sessions. Subsequently, SDD scientists have extended the hybrid model to integrate wiki technologies to support the first phases of the process: the collection, clarification, and discussion of learners’ contributions implemented through a wiki. The wiki offers a self-documenting mechanism and also serves as a shared space where deliberations can continue after the completion of an SDD process. (For more information on the processes for a typical hybrid virtual and face-to-face SDD co-laboratory, see Laouris et al., 2008; Laouris et al., 2007; Laouris & Michaelides, 2007; and Laouris, Michaelides & Sapio, 2007.)

What Are Wikis and How Are They Currently Used?
The purpose of a wiki is to function as a Web page that is quick to edit and can be used as a shared space of collaboration. A wiki can be set up so that a user can easily add, remove, edit, and change the content of the page. One of the most important features of a wiki is its “history” feature, which allows wiki owners to view all previous edits to the wiki, along with the edits of respective authors. If needed, the wiki can be “rolled back” to a previous state. This ease of interaction and operation makes wikis effective tools for mass collaborative authoring. Augar, Raitman, and Zhou (2004, 2005, 2006) note that wikis have two different styles of usage. The first is known as document mode. In document mode, learners
create collaborative documents (chapter 11). Multiple authors can edit and update the content of a document. Gradually the content becomes a representation of the shared knowledge or beliefs of the contributors (Leuf & Cunningham, 2001). The second wiki style is known as thread mode. Contributors carry out discussions in the wiki environment by posting signed messages. Others respond, leaving the original messages intact. Eventually a group of threaded messages evolves (chapter 14). Wikis can also have two states, read and edit. Wikis are in a “read” state by default (i.e., a wiki page looks like a Web page). When a user wishes to edit a page, s/he must access the wiki’s “edit” state.

Since their inception, wikis have found application in education as Computer Supported Collaborative Learning (CSCL) tools. For example, Leuf & Cunningham (2001) describe wikis being used at Georgia Tech University to facilitate CSCL. The Georgia Tech wiki, known as CoWeb, enabled students to create documents as a group, review articles and post comments, create informational resources similar to Wikipedia, and disseminate information among the student body. Augar et al. (2004) describe work at Deakin University with wiki applications such as hosting an icebreaker exercise to facilitate ongoing interaction between members of online learning groups. Further examples of wiki uses are presented in chapters 11 and 14.

The combination of ease of use and potential for collaboration is making wikis a powerful distance education tool. Current applications in educational spaces include: student collaboration, exploring new projects, and opening the “classroom.”

**Student collaboration**

Wikis represent a place for learners to work in small groups (Underwood, 2008). The shy, quiet student is “heard” on the wiki through his/her contributions. The student who is always the first to contribute will not receive undue attention or become frustrated for never being chosen, as his/her contributions are combined with the rest of the group on the wiki. Instructors can easily monitor the progress of group work, and post helpful hints and reminders. The result may be a compendium of information about a topic that students can access whenever they
need to do so. Teachers and students may also post their course notes on wikis. Some students may do so to help their peers. Others do so because they were asked to do so by their instructor. Some may feel that this is an instance of cheating, while others may feel that this is an example of open learning. The true educational value occurs when student additions extend and clarify the information given by the instructor. The advantage to this kind of collaboration is the fact that the collectively authored notes represent an amount of knowledge that is more than the sum of the knowledge that each individual had before the process (referred to as an “emergent property” in the science of complex systems). For example, students may come to know what their peers know best, their different perspectives, and whom to “consult” on different issues. Furthermore, students have the opportunity to ask each other questions to clarify meanings and concepts.

**Exploring new projects**

This application is probably most suited for the wiki whenever there is a topic that is new to the class and to the instructor. Students and instructor explore the topic together and *collectively create a knowledge base* on the wiki. They “teach” one another and “interact” on an equal playing field, and together co-create an understanding of a topic. Such activities require an innovative instructor who is willing to step out of his/her role as “keeper of the knowledge” and step into the role of learner along with the students, while still supervising, monitoring and imposing structure (chapter 14).

**Opening the “classroom”**

Wikis provide opportunities for openness in the classroom. Possibilities arise to have other learners from the same institution or from another country “visit” and review and critique projects. For example, Couros (chapter 6) discusses opening his classroom to his personal learning network. Vicki Davis (from the U.S.) and Julie Lindsay (from Qatar) present the Flat Classroom Project (n.d.), which uses a wiki to join two classrooms into one large virtual classroom where middle- and high-school students from two different countries collaborate on projects.
throughout the school year. The Palestinian-German Twinning School Programme (n.d) offers similar virtual communications to enable children in Gaza to interact with German peers. In 1998 in Cyprus, Hrach Gregorian and the first author of this chapter collaborated with the International Communication and Negotiation Simulation Project (ICONS) of the University of Maryland to allow Turkish- and Greek-Cypriots to participate in virtual negotiation workshops at a time when crossing the border was not possible (Kaufman, 1998; Laouris, 2004b).

** Wikis Embedded within a Structured Dialogic Design Process **

The purpose of the following sections is to describe recently implemented applications, which demonstrate the combined application of wikis and/or other synchronous/asynchronous communication technologies embedded within the SDD process. The goals on which we focus our efforts include:

> exploit the power of wikis and offer a smooth transition between current wiki uses and the integration of SDD;
> design a *hybrid* learning environment in the sense of enabling synchronous and asynchronous interactions between learners;
> enable *structured* and *focused* collaboration between learners;
> ensure that the *process remains structured and controlled*; and
> ensure that the *process can be completed* and learners will reach a well-defined goal.

** Application of SDD to facilitate educational reforms **

The SDD method has been used in settings that aim to facilitate educational reforms. For example, in 2007, the State of Michigan, decided to include universal design for learning (UDL) in their educational curriculum. UDL is a framework for designing educational environments that enable diverse populations of learners to gain knowledge, skills, and enthusiasm for learning. To help support systemic change needed for UDL, the State of Michigan established a referent group of diverse stakeholders, including many from general education, to
Develop a shared vision for Michigan with regard to meeting the needs of diverse learners (Christakis, Coston, & Conway, 2007). During the referent group’s dialogic deliberations in three two-day participative events, called co-laboratories, the participants identified (a) idealized requirements, (b) barriers, and (c) opportunities for developing learning community models complementary and compatible with the principles of UDL. The SDD process was employed to enable the diverse group of stakeholders to use democratic planning to address complex, boundary-spanning challenges at the state level.

One year later, a small school in Michigan used a streamlined virtual Internet version of the SDD called Webscope© that enabled multiple stakeholders at the local school district to participate in a mixed-presence approach (Bausch et al., 2008; Underwood & Christakis, 2008). The stakeholders were busy educators from a school district who did not have the time or money to meet face to face for 6 days. The mixed-presence disciplined dialogue took place using a Webscope© wiki approach and enabled participants to discover the root causes of the issue of high dropout rates for their school district. The stakeholders were also able to recognize the complexity and multidimensionality of the problem confronting their community.

All the participants reported that they had had no experience using a wiki prior to this project. They were familiar with using e-mail to communicate with each other, and half of them had participated in a Web seminar in the past. The one-hour Web seminar on how to use the Webscope© wiki appeared to be sufficient to get them up to speed on how to use a wiki. The only suggestions/corrections given while participants collaborated online were related to the disciplined process as opposed to the actual use of the wiki technology. For example, during Round 2 of the Webscope©, participants were reminded to refrain from making judgments or comments but, instead, to just ask clarifying questions.

When using the Webscope© wiki, participants typed comments and questions into online dialogues as they learned from each other about their individual perceptions of the factors contributing to the dropout rate. Although a schedule was followed, the flexibility of the wiki...
allowed everyone to contribute while they were in their own place at their own time. For instance, participants reported that some of their wiki entries were completed while they sat in their living room, with their children playing nearby; other entries occurred while team members were at a conference or on vacation. In essence, the Webscope® wiki was a virtual democratic space (see chapter 14) where participants met to discuss the high dropout rate issue.

While meeting face to face for disciplined dialogue is most effective, all participants agreed that, given their busy schedules, engaging with the first four rounds online saved time and was a convenient way for their group of stakeholders to actively participate. Additionally, the virtual SDD significantly improved the efficiency of producing results by offering stakeholders the opportunity to interact at different times from different places. Preliminary estimates indicate that virtual SSDs will reduce the cost of face-to-face meetings by a factor of six by minimizing participants’ travel and per diem expenses (Christakis & Underwood, 2008).

Analogous co-laboratories have been organized in Cyprus with United Nations and European Union funding. For example, the United Nations Development Program funded an initiative running under the title “Building a multi-ethnic and multi-national Cyprus to promote European values and regional and international peace.” This project used structured dialogue in five elementary schools in Cyprus to assist participants in developing a vision for a multicultural transformation of their schools (Multicultural schools, n.d.). The process engaged not only teachers and parents, but also young pupils. It was probably the first time that Cypriot youth (12 years old) participated on an equal footing in designing the schools of the future. Because of practical difficulties and busy schedules, the SDD process was implemented as a hybrid of synchronous and asynchronous sessions. The results have shown that the Structured Dialogic Design was instrumental in empowering and liberating young participants to contribute significant ideas. Figure 8.1 shows the vision map constructed by the participants of one elementary school, with about half the ideas coming from youth. It is worth noting how the collective wisdom of a small number of pupils, teachers, and
Figure 8.1 Vision map constructed by pupils, teachers, and parents of one Cypriot elementary school
parents resulted in a detailed map and important ideas surrounding educational reforms. At the end of the SDD, the participants decided to continue with the envisioning and implementation of practical actions designed towards materializing their vision.

**Application of SDD to support group learning among youth representatives**

The next example demonstrates the application of the SDD process to support group learning. The participants were twenty representatives of youth organizations from eleven European countries. Their goal was to identify the reasons why youth across Europe do not actively participate in European projects and affairs. Youth were engaged in three consecutive SDDs, which took place in Cyprus, Italy, and Romania. Their ideas were partly collected by e-mail and partly documented in wikis. The resulting tables with all ideas were categorized in clusters, and the resulting map of their first co-laboratory can be found online at the project’s wiki (http://ucyvrok.wetpaint.com). Through group work, participants seemed to significantly expand their knowledge and understanding of the situation: whereas one individual could come up with three to seven ideas, all participants together came up with an average of one hundred ideas (in each co-laboratory). Additionally, the structured process facilitated a gradual evolution in their thinking such that the youth did not only adopt ideas coming from others, but critically evaluated and enhanced their own ideas as well. Through the process of exploring the influences of one idea on another, they agreed on which ideas might be more influential than others when designing problem solutions. This project is ongoing, and the wiki serves as a continuing collaborative space. The final results will be forwarded to the European Parliament, the body that first raised this concern. The SDD process has made it possible to collect ideas from twenty individuals across eleven countries to be used by a legal body such as the EU Parliament so that targeted actions can be taken.
Discussion

Educators around the world show increasing interest on the concept of “collaborative” or “peer” learning. The benefits of peer learning have long been recognized (Jonassen, 1994), and recent research about peer learning focuses mainly on collaboration, communities of practice, mentorship, and other models of peer interaction (Hansman, 2008). Yet despite the increased interest and expectations to use peer learning in classrooms, we are still missing appropriate methods and tools. Much of the published work that examines the effects of peer learning stems from the social psychological construct of interdependence among members of a group (O’Donnell, 2002). Strategic and effective use of peer learning in the classroom requires teachers to understand the implications of a variety of theoretical approaches so that they can adapt their use of peer learning to the demands of the task. The application of Structured Dialogic Design is a promising tool towards this direction.

Wikis play a central role in the majority of applications that embrace collaborative learning. Raitman, Augar, and Zhou (2005) revealed the following as the greatest disadvantages of the application of wikis in education: (1) its faceless contact was not personal enough for real interactions to take place; (2) lack of discussion; (3) user-interface lacked simplicity; (4) pages are too long to scroll; (5) lack of real-time communication; (6) too easy to delete someone else’s contributions. Some of these disadvantages have been resolved because wiki technology since 2005 has advanced to meet user needs. However, the structured dialogue embedded within a hybrid Webscope® wiki satisfactorily addresses the challenges posed above: the fact that asynchronous interactions are complemented with synchronous plenary sessions renders the contact between individual learners more personal. The SDD process ensures structured communication: For example, the different phases of the SDD process allow learners to (a) engage in questions and clarifications through the wiki (i.e., Clarification Phase), (b) present and support their points of view, (c) engage in direct discussions, and (d) select and vote across contributions. Additionally, specific features of the SDD process lead towards valued goals. For instance, at times during the process, learners are prohibited from making value statements and criticizing
the ideas of others. This facilitates the creation of an environment of mutual respect and trust (Tsivacou, 1997).

Current trends in education shift more towards experiential, problem-based, just-in-time types of learning. For example, Knowles (1975) postulated long ago that (adult) learning must be problem-centred, rather than content-oriented. As a result of a nation-wide experiment, the authors also proposed that learning should focus on content that has immediate relevance to learners’ personal lives (Laouris, 1998b; Laouris & Anastasiou, 2005). The fact that the SDD process gives participants the freedom to contribute their ideas satisfies this requirement.

**Reaching a shared understanding under the SDD process**

The ultimate goal of a learning community is to reach a state in which all learners achieve a deep and shared understanding of the problem at hand (Law of Requisite Meaning, Turrisi, 1997). During the first rounds of the SDD (Figure 8.2), participants share their previous knowledge and their different points of view. Peer learners are encouraged to request clarifications, but they are not allowed to make any value statements regarding the statements or contributions of others. The authenticity and autonomy of each participant is “protected” through compliance with SDD rules that call for respect and tolerance (Law of Requisite Autonomy in Decision, Tsivacou, 1997). Upon completion of the initial phases, learners are expected to expand their explicit knowledge of the issue at hand due to information sharing and collaboration. The different types of knowledge acquired and refined during these phases are then further elaborated. Although ideas are formed in the minds of individuals, interaction between individuals within an SDD process typically plays a critical role in developing these ideas, in line with Vygotsky’s (1978) theory of constructivism. In other words, “communities of interaction” contribute to the amplification and development of new knowledge. At later stages of the SDD process, learners explore and compare ideas, exploring new viewpoints and discovering new perspectives. The nautilus spiral (Figure 8.3) offers a good visualization model borrowed from nature, which corresponds to the phases of a typical SDD process: during the first circle of an SDD, the number of
ideas increases quickly (the separators in the nautilus spiral lie close to one another). All participants expand their explicit knowledge about the issue. In subsequent circles, ideas develop in “depth” and quality and not in numbers. Learners achieve a much deeper understanding, as illustrated in the nautilus spiral, with the nautilus separators increasing in surface.

Through adherence to the laws of Structured Dialogic Design, we cultivate autonomy, facilitate evolutionary learning (Dye & Conway, 1999), and assist participants in achieving meaning and wisdom. Out of these largely cognitive processes, action emerges as a natural consequence (Law of Requisite Action; Laouris, Laouri, & Christakis, 2008), which translates to commitment, endurance, and intentionality of learning. The SDD process not only facilitates better learning, it contributes to rendering learners self-driven and more enthusiastic, therefore serving the learner-centred principle.

Figure 8.2 The spiral of learning. Knowledge is acquired in incremental phases. During each subsequent phase of the SDD process, learners acquire meaning and wisdom in an evolutionary manner.
Obstacles and inhibitors to the application of the SDD process in learning environments

The greatest obstacle to the application of the SDD in a learning context arises when learners are not expected to cooperate. Worse, when individualistic learning is valued more than collaborative learning, SDD is not the method of choice. An interdependent group is one in which the learning outcomes of its members are linked: in a truly cooperative interdependent group, no one can succeed unless everyone succeeds (Johnson, Johnson, & Holubec, 1992). The SDD process is, by design, such a group learning method. Learners learn more when they learn collectively (Johnson & Johnson, 2005). Indeed, the SDD process is inappropriate for individualistic learning (even though Bausch [2000] applied SDD to collect, condense and prioritize the principles or standards that govern the practice and ethics of design). An inhibitor closely related to the above lies in current assessment practices. If assessment gives learners the message that only individual achievement is valued, and that collaborative work is akin to cheating, then the potential of collaborative learning will never be realized. If learners are predisposed to this way of thinking, they might refrain from contributing during the process, thus seriously restraining the outcome.
In an SDD setting, the emphasis is in the application of *reciprocal peer learning*, in which students act both as teachers and learners. While there is recognition in the literature that peer learning can contribute to the social and psychological needs of learners (Griffiths, Houston, & Lazenbatt, 1995; Slavin, 1995), many authors tend to treat peer learning mainly as an instructional strategy, rather than an approach which pursues a broader educational agenda, as is so prominent in SDD settings (e.g., Multicultural schools, n.d).

The SDD process is also inhibited when one or more experts view themselves as possessing knowledge that needs to be transferred to learners. The SDD process is based on the assumption that a significant amount of knowledge already exists in the minds of the learners. However, no one learner possesses all required knowledge. Additionally, individual differences exist: learners' expertise and backgrounds may be different. The SDD process enables teachers and learners to efficiently contribute to each other's knowledge base using a structured approach, and to harness collective wisdom to co-produce meaning and wisdom without inhibiting or limiting individual learning.

Finally, the application of the SDD process might be hindered in situations where learners are not comfortable with the process, required technologies, and virtual environments. In a recent experiment, we engaged an international group of SDD experts to work together towards discovering the roadblocks facing President Barack Obama in realizing his vision of a bottom-up democracy (www.obamavision.wikispaces.com). This project highlighted some of the inhibitors and symptoms of technological/computing literacy.

**Conclusions and Future Developments**

Distance education virtual environments offer incredible opportunities for educators to engage learners in a variety of learning experiences. At the same time, “unstructured” environments pose new challenges (see chapter 14). Furthermore, some technologies (e.g., wikis) have an asynchronous character, while others (e.g., Multi-user Virtual Environments such as the one described in the chapter 15) are synchronous. Without the classic teacher-student roles (see chapter 3), it is becoming...
increasingly difficult to provide basic instruction and guidance. Distance educators need to explore new ways of teaching (chapter 2) by capitalizing upon the multi-faceted nature of new media, rather than by simply translating existing face-to-face techniques into the new media. Theories of education cannot simply be transferred in new learning environments. Since emerging technologies for education transcend academic disciplines (chapter 1), it is also necessary that we develop new theories of education and learning that account for diverse constraints and challenges. The SDD approach offers a theoretical grounding that is promising. SDD has recently been used in the context of distance education for learners to explore solutions to societal issues and concerns. However, the method has not yet been tested for diverse types of content and learning: our work has focused on complex societal problems while traditional content areas such as physics, biology, economics, and mathematics have not yet been investigated. The SDD approach is particularly useful for problems that are complex and for which learners might have different perspectives and possibly conflicting interpretations. However, as discussed above, the method also faces shortcomings. In the future, it is desirable that the method is tested in diverse educational settings.

REFERENCES


Laouris, Y. (2005). The computer has elicited a new evolutionary step in the development of the human mind. *(draft available on request).* Nicosia, Cyprus: Future Worlds Center.


