Online learning has changed the face of education quite remarkably over the last decade. Rather than a slow evolution as are most things in education, it seems to have come almost as a revolution. Although the first online degrees were offered in the late 1960s, it is only over the last few years that we have seen the tremendous growth in popularity of the online paradigm. There are a number of factors contributing to this, but fundamentally the two major developments having the most impact are the changing face of the student population and the development of the Web.

The average student today is difficult to stereotype. Most will be in some form of employment, either part or full time, and many are professionals who find it difficult to balance work, education and family. Many working professionals are now returning to universities to either complete studies, or undertake new programs to further their skills. Above all is the requirement for flexibility. The ubiquitous nature of the Web has provided an almost perfect platform for hosting the online classroom environments and delivering the flexibility of access. The design of the online program itself can provide further flexibility, depending on the paradigm used. While online learning does not necessarily involve the Web, it has been predominately used in one form or another as a means for universal delivery.

In the early technology phase of online learning, much of the research and literature focus was placed on the technological aspects of teaching in a virtual class. However, the technology has matured and currently there are some very good online learning environments to facilitate hosting virtual classrooms, for example WebCT, FirstClass, Blackboard and so forth. With the technology becoming less of an impediment, much of the focus has turned to the cognitive aspects of online learning. While these issues have always been uppermost in the thoughts of curriculum developers, quite often the technology
became the focus because of its obtrusiveness in the virtual class. By focusing on the cognitive aspects of online learning we can address many of the fundamental issues that have been shadowing developers and proponents for quite some time.

There are issues such as quality of the program, how educationally sound the program is (not necessarily the same as quality), its effectiveness and of course its applicability. There are also concerns about the risks of such programs, should we embrace the online paradigm without caution. Many of the instructional technologies we now utilize allow us to address these issues and focus more on the cognitive aspects in online course design. However, when focusing on such issues it becomes clear that the courses must be designed around the major stakeholder, the student. While there are other stakeholders in the learning process, due to the essential individual nature of the online learner, it is vitally important that more focus be placed on the individual. This is often not practical in the counterpart on-ground course, and thus becomes a major challenge for the online developer.

In focusing on the individual, attention must be given from the initial development stages of the course to the rights, expectations and achievable outcomes of the students undertaking online study. In Chapter 1, “Developing Distance Learning Programs: Applied Learnings and Thoughts,” Baim examines this process of develop an online course at institutions that do not yet have such courses. Baim does this through explorations of students’ thoughts on online learning. These thoughts are derived from firsthand experience, and with students engaged in discussions in online classes. Baim highlights the importance of developing a clear “road” map as to what is to be achieved by the students in an online course and the resources needed to facilitate these before development begins. A set of guidelines that can help in the development of a successful program are provided by the author.

In Chapter 2, “Online Multimedia Educational Application for Teaching Multimedia Contents: An Experiment with Students in Higher Education,” Prata and Lopes present a nine-point educational software model to be used for the planning, development and evaluation of online instructional components. Prata et al. use this model to design a prototype online multimedia educational application, and report on the success of the application of the model. Modules of the prototype were used by some students as replacement for traditional instruction, and some interesting results in the success of the students are reported. The development of such models and their continuing refinement and evaluation play an important role in future development of online courses. They represent the accumulated wisdom and experience of previous
online development, which facilitates future efforts. The model presented by Prata also includes a fairly extensive design phase that allows the developer to consider all aspects of the learners’ needs before actual construction takes place.

While attending to the needs of the individual learner, we must also focus on what is important for them, the outcomes. The ultimate goal of all education is to achieve positive outcomes for the students through the quality of the programs. Outcomes can be measured in a number of ways, and traditionally this is achieved through testing and evaluation. Online learning often requires different approaches and paradigms due to the nature of the delivery, and in many of the paradigms, traditional testing is not undertaken. In such cases, student satisfaction with the program is often used as an indicator for outcomes achieved. However, is student satisfaction an indication of program quality and achieved outcomes?

In Chapter 3, “Building Quality from Satisfaction in Online Learning Using Total Quality Management: A Case Study,” Darbyshire investigates the relationship between student satisfaction and program quality. Darbyshire argues that while student satisfaction may not necessarily be indicative of quality, we can use total quality management techniques to build quality from satisfaction. This chapter utilizes satisfaction survey data from a case study of an online Masters degree program utilizing total quality management techniques. The satisfaction survey data are used as feedback loops into all courses and continual refinement based on the feedback is used to improve quality. The author concludes that online courses based on total quality management practices, coupled with “best practice” design and utilizing student satisfaction feedback, will lead to quality online courses.

Chapter 4, “The Determinants of Web-based Instructional Systems’ Outcome and Satisfaction: An Empirical Investigation” by Eom et al. further explores the relationship between student satisfaction and outcomes. The authors conduct an empirical investigation from data collected via surveying students enrolled in Web-based online courses. Eom et al. develop a model to explain the relationship between student satisfaction and learning outcomes, and shows these to be two dependent variables. The authors also show that the student satisfaction has a direct link to the course content, thus also underlining the importance of the design of such courses already indicated in the previous chapters. Such results are significant to our continual understanding of factors contributing to successful outcomes, and thus assist in the development of quality online programs.
Although many courses that are delivered online implement learning paradigms where assessment is not conducted via traditional testing, it still remains the most widely accepted means of evaluation. Also, the question of testing online students has always been one of the long-standing problems leveled against the paradigm. However, traditional testing has many deficiencies, for both on-ground and online teaching. In particular, examinations are usually limited to a portion of the material taught in the course and the results may not reflect the true nature of a student’s understanding of the subject material. In Chapter 5, “Semi-Adaptive Testing Strategies in a Web-based Generic Tutoring System,” Brust examines the cognitive aspects of various test paradigms. Brust proposes the use of adaptive tutoring systems for implementing a testing paradigm to overcome the limitations of traditional testing. Tutoring systems are in general heavily domain oriented, but Brust discusses the use of XML to develop a generic tutoring system that can be adapted to different domains.

Another form of pedagogical activity to enhance student outcomes is that of Problem-Based Learning (PBL). However, there is some difficulty with co-operative problem-based learning using some of the open learning tools. In Chapter 6, “UML-based Modeling of Educational Components for Co-operative Problem-based Learning Situation Design,” Laforcade and Barbier propose an approach to the problem by using the idea of educational software components. These components provide a specification of the cognitive models of pedagogical activities involved in problem-based learning. Laforcade et al. discuss the use of UML for the presentation of these educational components. The aim here is to increase the flexibility of online tools to provide support for co-operative problem-based learning.

While the general focus of online learning is generally towards post-secondary university level and above, there are of course many online initiatives being developed for corporate training purposes. The commercial online training initiatives are generally refereed to as e-learning, fitting many of the other commercial ‘e’ type activities. The corporate training market is very large, and companies are now using e-learning to more effectively meet their training needs in a climate of increasing training costs and requirements for flexibility of training times for employees. Many of the issues concerning higher education online learning and corporate e-learning are similar. Evaluation must take place to determine the strengths and weaknesses of any program. In Chapter 7, “Assessing the Effectiveness of E-Learning,” Kwisnek details the assessment of the effectiveness of a corporate e-learning program. The program was designed by the author to convey safety and health and requirements to satisfy Governmental Occupational Safety and Health Administration requirements.
Kwisnek used both pre-course and post-course surveys to evaluate the effectiveness of the program.

While in some of the previous chapters we focused on the needs of the individual in the online learning environment and the importance of positive outcomes, we also need to examine the effectiveness of online learning programs as a whole. Many online courses use a form of student profiling to help select candidates for online courses, and the profiling may be as simple as a self-evaluation questionnaire. Chapter 8, “E-Learners at Risk: The Effect of the Online Learning Environment upon Mid-level Achievers” by Marold and Haga, provides some valuable insights into the effectiveness of online learning and profiling. The authors provide details of a three-year study that details student results and their ability to apply IS theory in a programming course, with both traditional on-ground learners and online learners. Marold and Haga conclude that if we view the student population in terms of three broad bands, high, mid and low-achievers, it is the mid-level achievers that are more affected by the online learning environment. The traditional classroom seems to suit the mid-level achievers better than the online class.

Finally, an important aspect often overlooked in the design and delivery of online courses is that of privacy. While not directly related to cognitive aspects of online learning, the issue of confidentiality and the individual’s perception of it in the class may directly affect outcomes. There is also the issue of legal rights to privacy by the individual. In Chapter 9, “Privacy Policies and Their Negotiation in Distance Education,” Yee and Korba discuss this issue of privacy in the e-learning environment, and detail an approach to negotiating privacy policies between the e-learning consumer and provider. As Yee and Korba point out, a policy-based management system can be put in place for an e-learning system, but the policies must reflect the wishes of the consumer and provider. The authors use privacy policies and an e-service model and detail a scheme for negotiation of privacy policies under uncertainty.

As the demands for flexibility in education grow, so will the number and diversity of online courses. The challenges for online developers have shifted focus in recent years from the technology to the cognitive aspects of online learning. By addressing these aspects we continually improve the quality of online courses and hence, student outcomes. The chapters in this book touch on many aspects of the cognitive elements associated with online courses and learning, and provide some valuable insights for developers. However, online learning is not without risks, and there are still issues that must be addressed to allay scepticism on all sides. The online paradigm is not for everyone and it
would be a mistake to embrace it as a panacea or one-size-fits-all solution to education. While there are some excellent fully online programs, on the whole, quality online courses addressing the individual learning needs will make valuable contributions as adjuncts to wider programs at both the undergraduate and graduate level.

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