



Helping Publishers (and Educators) Master Outcome-Based Education

Executive Summary

Educational publishing has changed profoundly during the past 20 years, primarily in response to an educational reform movement known collectively as “outcome-based education.”

While many separate calls for change have been combined under the outcome-based education (OBE) umbrella – for example, increased educational funding, metrics-based evaluation of educators, and requirements for better graduation rates – the core of this emerging model is a focus on empirically measuring student performance against standards established for each discipline.

This student-centered learning philosophy, with its emphasis on performance, or outcomes, contrasts with traditional educational models which focus on the resources available to the student – the educators, textbooks or other learning materials and assessment tools that have traditionally served as inputs for the student.

This white paper discusses the impact OBE has had on the entire educational publishing market, including K-12, secondary and post-graduate education. It also offers our perspective on how educational publishers should leverage learning management systems to craft and deliver unique content and services for this nascent, but fast-growing, market. Finally, we recommend changes to educational processes themselves to overcome the challenges of implementing truly outcome-based education.

OBE's Effect on K-12 Education

In the U.S., Europe and Australia, the effect of national, state and local (district-level) establishment of standards for education have had a profound effect on educational publishing.

The explosion of standards for K-12 education in the U.S., especially those defined at the state or local school district levels, emerged in the 1990s and is reflected by initiatives such as:

- **The Texas Assessment of Academic Skills** is a standardized test used from 1991 through 2002 (and replaced by the Texas Assessment of Knowledge and Skills in 2003) to assess students' proficiency in reading, writing and math, for grades 3 through 11. (Passing the grade 11 exam is required for graduation.)
- **The Washington Assessment of Student Learning** is the primary educational assessment system for the state of Washington from 1997 through 2009. (It is now replaced by the High School Proficiency Exam for high school students and the Measurements of Student Progress for grades 3-8.)
- **The Massachusetts Comprehensive Assessment System** was developed in 1993 in response to the state's Education Reform Act mandating standards-based assessment in English, mathematics, science and technology/engineering in grades 3 through 10.

The best-known and most far-reaching standards-based education law in the U.S., the No Child Left

Behind Act of 2001,² requires states to develop standards in basic skills, and assessments of those skills, to be applied to all students in certain grades, if those states are to receive federal funding for schools.

In addition to state or national OBE initiatives, local school districts in the '90s began mandating courseware specific to their geographic areas. For example, school districts could specify that elementary school history instruction reflect landmarks or events that are part of the history of their local area. Districts in Texas and Missouri have decreed that creationism be taught along with evolution in biology classes.

However, the effect of the OBE movement is certainly not limited to the U.S.:

- The Australian government in Canberra (Western Australia) has mandated the use of some form of OBE for grades kindergarten through 10 for several years, and is currently extending the concept of outcomes, and testing to verify those outcomes, for grades 11 and 12.
- OBE was introduced in South Africa in the late 1990s by the post-apartheid government as part of its Curriculum 2005 program.

The effect of each state, or local school district, mandating unique (and often conflicting) subject-specific teaching standards (and for how students should be assessed against the mandated outcomes for each subject) has placed a tremendous strain on publishers of K-12 educational materials.

No longer can educational publishers depend on a go-to-market strategy based on creating one set of materials per subject, per grade, saleable across an entire country. Now each state or region, or even each local school district, has its own specific requirements for textbooks based on its own idiosyncratic standards.

The manual customization of educational materials is labor-intensive, time-consuming and expensive. Publishers often have to turn down requests for customized educational materials because they cannot recoup the costs of producing these materials.

OBE's Effects on Higher Education

The demand for an outcome-based approach to education is not limited to K-12 educational publishers.

Although higher educational institutions (universities, community colleges, graduate schools, etc.) are not often faced with state-defined mandates to match pedagogic methods to standards, universities do face pressures for standardization of educational methods for other reasons:

- **The current lack of widely accepted standards, and their adoption, hinders the effective implementation of learning technologies.** New Web-based methods for offering educational materials and courseware are hampered by the lack of agreed-upon standards; breakthroughs in digital delivery of higher education courses suffer from the lack of agreement on how educational outcomes are to be delivered through such methods.
- **Collaboration between institutions on how courses of learning should be established for specific disciplines is retarded due to the lack of standardization.** Even in such standard-driven disciplines as law, medicine, accounting and engineering, differences in how these standards should be applied make sharing of content, and sharing of pedagogical approach, difficult. (And, in an increasingly virtual world, where students expect the ability to start their course of learning at one institution and continue it at another, the lack of standardization makes it difficult for institutions to even agree on where a student is in their course of study and what outcomes they have actually achieved.)
- **Integration, sharing and reuse of educational content, and enablement of functions such as federated search across content repositories, is made more difficult** if institutions are mandating content creation according to different standards.
- **Assessment and evaluation tools, and their critical place in establishing and achieving outcomes in education, are obstructed** within a discipline if agreement is not reached on the specific outcomes these tools are meant to evaluate.
- **Finally, economic pressures brought to bear on students because of the current economic malaise have made them more critical "shoppers" for educational value.** A higher education environment where institutions cannot agree on standardized outcomes for a course of education makes it difficult to students to compare one university's course set to another's.

Custom Publishing and OBE

In reaction to the market's demand for customized educational materials, educational publishers have endeavored to create systems where instructors can select content from existing textbooks, sequence those content objects into whatever order they dictate, define custom cover material including title text and images specified by the instructor, and then render the custom product into print or e-book formats.

The goal of instructors in using these custom publishing platform is to match the instructional content used in the teaching of the course to the outcomes, defined either by national, state or local school districts (in the instance of K-12 education), or by standards bodies serving specific academic disciplines in the case of higher education, that students are intended to achieve. What follows are examples of how publishers are responding to the OBE movement.

Safari Books Online

The first successful custom publishing engine was Safari Books Online, founded in 2001 as SafariU. Safari Books Online is a digital library created as a joint venture of O'Reilly Media and the Pearson Technology Group.

Safari is a subscription-based digital library, containing content from books, videos, short-form content ("Short Cuts") such as white papers or treatises and rough-cut content ("Rough Cuts") from O'Reilly Media and other publishers, including Addison-Wesley, Prentice Hall, Peachpit, John Wiley & Sons, Microsoft Press, Adobe Press, Cisco Press, Manning Publications, Packt, SAS Publishing, IBM Press, FT Press and Focal Press.

As an online, searchable repository of primarily technical content, Safari Books Online allows users to execute keyword searches across the full content of thousands of books, pre-publication manuscripts, short documents, articles and training videos, and consume that content online. However, the innovation that Safari brought to publishing is allowing users to select components of published works – say, Chapter 4 from Book A, Chapter 7 from Book B, Chapter 11 from Book C, etc. – arrange those components into the desired sequence, place a custom cover onto the customized e-book, and output that custom book in a number of digital formats.

In addition, Safari Books Online allows users to jump to related content across several books,

create notes, download exercise files, bookmark key sections, highlight text and build customized RSS feeds. And, to meet the demands of a marketplace where mobile devices have become ubiquitous, Safari Books Online offers the ability to search and read directly from cell phones and tablets.

Subscription plans to Safari Books Online may include access to a limited amount of content each month, or unlimited access to all materials in the digital library.

McGraw-Hill Create

Originally brought to market under the name Primus, McGraw-Hill Create allows educators to build custom educational materials by selecting desired content from multiple sources, arrange or sequence the content to fit the teacher's syllabus, and include the teacher's own, original content to the mix, if desired.

Users first find content by searching across a repository of thousands of McGraw-Hill textbooks and third-party content. Once the desired content is found, teachers can select the chapters they wish to include in the custom textbook, and, if they like, include section dividers or add their own content – originally authored material, a course syllabus or teaching notes – to the book.

Users may then define a custom cover for the customized textbook, adding their name, the course name, the school name and course information to the cover using graphical templates. Finally, users can render the custom product in a number of e-book formats; or choose to create a print book, in color or black-and-white, and either contract with a local printer to print the book or arrange with McGraw-Hill to print the book using print-on-demand technology.

Pearson Learning Solutions

Pearson Learning Solutions, a division of Pearson Education, is a custom publishing platform based on the content produced by such Pearson imprints as Prentice-Hall, Allyn & Bacon, Longman, Addison & Wesley, Benjamin Cummings, Financial Times, Penguin, QUE and SAMS.

Pearson Learning Solutions takes a more collaborative approach to custom educational

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publishing. Educators work with a “local custom field editor” to define course content that coordinates with course curricula and assessment (testing) materials. This content may come from Pearson’s extensive textbook-content repository; may include content developed by the educator; may include other custom-developed course materials already created by educators from other institutions; or may include course content specifically developed for the custom product by Pearson content developers.

Pearson’s CourseConnect program allows educators to not just customize course content, but develop entire online courses designed to manage the achievement of specific outcomes.

These custom learning solutions may be output as custom textbooks; as digital or online products; or used as part of a complete e-learning experience through incorporation in an online Learning Management System (LMS).

Pearson’s CourseConnect program allows educators to not just customize course content,

but develop entire online courses designed to manage the achievement of specific outcomes. Courses may be modularized into smaller topics that each follow a consistent learning model, sequencing instruction through an introduction, presentation, practice section and review. Assessment components are created to match the customized course content, including supplemental assignments for students who need additional help with a subject, revised discussion questions, and quiz items specific to lessons that help students achieve subject mastery. These custom courses are designed to work with any LMS.

The ability to customize courseware takes educators only partially down the road to outcome-based publishing. Arguably, for courseware customized to meet state or local school district standards for K-12 education, the real outcome is for the educator, not the student.

Wiley Custom Select

A service of the Higher Education division of John Wiley & Sons, Wiley Custom Select (introduced in 2009) is designed to allow educators to build customized higher education materials that fit their specific pedagogical needs.

Instructors can search for content across an extensive collection of Wiley higher education course materials, and select content they wish to include in a customized textbook – selecting not just at the chapter level, but all the way down to individual pages of textbook content. If the selected content is in XML format (and about half of the content available through Custom Select is in this format), users may edit the content to meet their specific needs, and contribute their own content not just as separate components within the textbook but mixed in with the Wiley content. (Such editing may affect the price charged for the customized content, reflecting changes in the royalty payments made to textbook authors. Also, as allowing users to add content to Wiley content may mean that users add material produced by other educational publishers, Wiley will contact other publishers and pay royalties to those publishers if this condition exists.)

Instructors can then customize and personalize the format, choosing print or e-book, black-and-white or color printing, soft or hard cover binding and individualized title page and cover copy. They then can preview and submit the fully assembled book content, review an instant price quote and submit the order. If the instructor chooses print books, copies will arrive at the college bookstore within a few weeks; if an e-book format is selected, a Wiley digital edition of the book will be available sooner.

From Custom Publishing to Outcome-Based Publishing

The aforementioned examples illustrate the value of custom publishing models for educational publishing for both K-12 and higher education. Administrators and educators can develop courseware that includes only the subject matter they want or need to teach. Users can often combine publisher-produced content with their own content, or content from other publishers. Specific formats for books, be they print books or digital versions, can be chosen to match the instructor’s preferred pedagogical methods. And, as customized textbooks typically include only a subset of the content included in base textbook editions, pricing for customized textbooks usually is lower than that for the base edition.

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standards for K-12 education, the real outcome is for the educator, not the student.

The ultimate driver for standards-based education, at least in the U.S., is for school districts to receive state or federal funding, based on the performance of students on standardized tests. Custom courseware may be developed to teach “to” these tests; and assessments to evaluate progress on the understanding of content on which the students will be tested can be developed to match the customized content. But this model does not directly address the desired outcome of the ultimate end user, the student: to pass the course and, ultimately, receive his or her desired degree.

To enable the desired outcomes for the student, customized content and assessment materials must be part of a LMS that can deliver, not just content specific to the course, but assessment tools to evaluate the student’s progress at every step of the course. Students also need remedial learning materials to aid in developing mastery of concepts the individual student is struggling with; and workflow-oriented tools to direct the student in accomplishing granular tasks that lead ultimately to his/her desired outcome: subject-matter expertise, and the subsequent passing of the course.

Outcomes and Learning Management Systems

An LMS is a software application that enables the administration, documentation, tracking and reporting of educational programs, classroom and online events, e-learning programs and the content and assessment tools necessary for students to develop mastery of subject matter. Ryann Ellis, in a paper titled “A Field Guide to Learning Management Systems”³ sponsored by the American Society for Training and Development, noted that to be robust an LMS must:

- Centralize and automate the administration of an educational course or program.
- Enable student self-service and self-guided services for consumption of content and assessments.
- Assemble and deliver learning content rapidly, and in an “on-demand” model.
- Consolidate learning initiatives through the use of a scalable, Web-based platform.
- Enable the personalization of content specific to the desired outcome of the student, and enable knowledge reuse.

- Support standards that define the desired outcomes of students, a characteristic critical to OBE.

Increasingly, educational publishers are moving beyond their traditional focus of creating educational materials such as textbooks, and creating assessment tools such as software that quizzes or tests students on concepts taught in classes. They are doing this by working with leading LMS providers, or by creating their own LMS platforms.

For example, in July 2011 McGraw-Hill Education announced a partnership with Blackboard, an LMS vendor, to enable the delivery of content and other educational tools from its Create custom publishing platform that plugs directly into the Blackboard Learn online LMS system. This partnership enables educators not only to customize educational content, but to use that content as the basis for an educational experience that guides students toward the desired outcome of course completion.

WileyPLUS

Another leading union of educational content with online courseware that leads students not just to consume the content, but to achieve educational outcomes based on that content, is WileyPLUS. Unveiled in 2005 by John Wiley & Sons, the WileyPLUS marketing tagline is “Leveraging Blended Learning for More Effective Course Management and Enhanced Student Outcomes.”

WileyPLUS was developed partially in response to a U.S. Department of Education study of research literature⁴ on online learning which identified 99 studies that objectively measured student outcomes. The study focused on the following four questions:

- How does the effectiveness of online learning compare with that of face-to-face instruction?
- Does supplementing face-to-face instruction with online instruction enhance learning?
- What practices are associated with more effective online learning?
- What conditions influence the effectiveness of online learning?

The study’s key findings:

- Students using online learning resources spent more time on task than those in face-to-face learning conditions.

- It's not simply the inclusion of more online media that exerts a positive impact on student outcomes, but the ability of learners to control their interactions with the online resources.
- Prompting students to be more reflective and to self-assess via online resources shows promise for improving learning outcomes.

For students, the biggest benefits of WileyPLUS are that course content can be accessed multiple times (and often through multiple content formats), supporting the learning preferences of individual students. Also, textbook material is linked directly to problems, for easy access to

course material while doing homework or practice exercises; and there is access to guided online tutorials to break problems into steps, providing hints for students along the way.

For instructors, WileyPLUS offers a variety of course management tools that make it easy to create and grade assignments. Online gradebooks allow instructors

to trace the progress of individual students to quickly determine learning gaps. Automatic grading makes it easy to manage even large class sizes.

For both students and instructors, however, the biggest benefit of WileyPLUS is that instructors can design and execute courseware that aligns content and assessment tools to the achievement of institutionally defined outcomes – from granular outcomes such as the mastery of the sub-section of a course, to the overall outcome of the student mastering all course content and passing the course itself.

HMH Custom Solutions

In response to the increasing demand from state and local school districts for custom educational materials that conform to educational standards established at the local level, Houghton Mifflin Harcourt in 2010 unveiled its Custom Solutions platform.

For content reuse, Custom Solutions follows the model already used by other custom publishing platforms: content is stored in XML format,

and tagged to enable reuse at a granular level. (Currently, Custom Solutions allows content definition and reuse at the chapter level; future versions may allow content reuse at the lesson or sub-lesson level.) Users can define custom book covers for textbooks, and sequence the content in the order they choose. Custom Solutions employs proprietary software for sequencing and rendering content, to enable the reflowing of content into print or e-book formats.

However, the differentiating aspect of Custom Solutions is the correlation, or linking, of content to the state of local school district standards the content satisfies. Users may search for content across grade level and/or subject matter, select content objects to be used in their custom textbook, and then see which local standards are met by the selected content. Conversely, users may search on the local educational standards themselves, see the content that satisfies those standards, and then select the content objects they want to include.

Users also can see assessment materials aligned to the selected content, and related standards, select those materials most appropriate to their goals, and choose where in the custom textbook those assessment materials should be included.

Currently, Custom Solutions requires an HMH sales representative to work directly with local users in defining custom textbook materials. Future versions may allow local users to create custom textbooks on their own.

Extending Content to Enable Outcomes: The Path Forward for Publishers

While custom publishing can certainly make it easier for educational publishers to deliver customized content that conforms to federal, state or local educational standards, the path to outcome-based education is only partially achieved through custom publishing models.

And, while integrating custom content and assessment materials with learning management systems may help in leading students through a workflow-driven path to mastery of subject matter, current LMS systems do not incorporate data on student behavior, the appropriateness of the content itself to different learning styles, and the direct correlation of content to educational standards to truly enable outcome-based education for a broad population of students.

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To truly enable outcome-based education, custom publishing and LMS models should be augmented to:

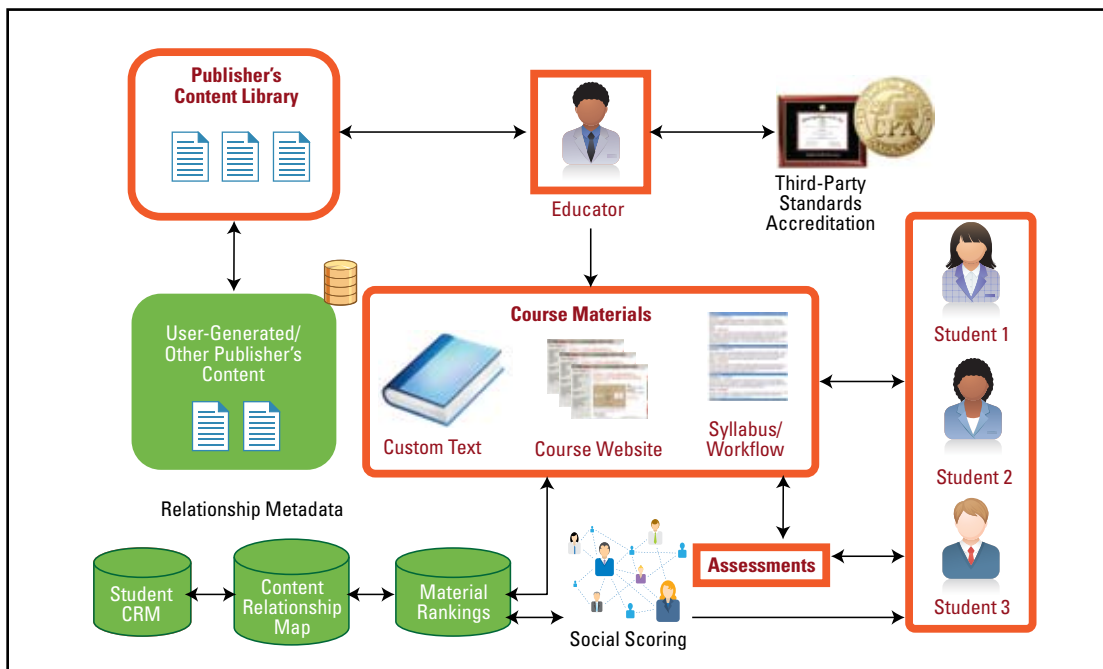
- 1. Incorporate student demographic and behavioral data.** Systems that can record, or at least store and manage, data that defines a user profile, including the student's demographic profile and a record of how the student has interacted with courseware objects during the course of study, can make the educational experience enabled by the LMS truly customized to the student. For example, the system itself can learn what sorts of content the user finds most useful in learning – say, user A's test scores trend low when he consumes textual content, but he more easily grasps concepts when using video-based materials. In gathering data on a wider population of users over time, the system can learn what content, assessments, and learning designs are most appropriate to different types of learners.
- 2. Incorporate data that ranks the effectiveness of learning materials.** As the LMS is used by more and more students, the system

can record data that reveals which content, assessment tools, or even entire courses, are most effective in leading a user to a specified outcome. Such functionality would make it much easier for educators to modify and improve courseware for subsequent users.

- 3. Relate content to the standards and outcomes desired by the student.** Earlier, this paper discussed attempts by educational publishing to link content to standards defined by state and local school districts. Such functionality can satisfy the desired outcomes for K-12 administrators – in the instance of the No Child Left Behind Act, to continue to receive federal funding through students passing standardized tests. But this model makes it difficult to define standards for achieving educational outcomes when no formal standards body exists, or when those standards are based

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Learning Management Systems Progression



To truly enable desired outcomes for students, future Learning Management Systems must incorporate CRM data defining the student's demographic profile and how that student has interacted with courseware. Over time, the LMS can record data defining the effectiveness of learning materials for the entire population of students taking the course. The LMS must allow educators, or those who define measures for disciplines, to link content to the standards it satisfies. Finally, social media may be used to create feedback loops, improving courseware and augmenting demographic data used to define effective educational programs.

Figure 1

on an amalgam of multiple standards for a specific discipline. Content relationship mapping tools should allow instructors to incorporate their own standards for achieving educational outcomes, to link those standards to content and assessment tools that direct students toward those outcomes, and even to create relationships between content objects where one piece of content does not satisfy the standard but a combination of content does.

- 4. Incorporate feedback loops for student input.** Formal evaluations by students on the effectiveness of courseware in achieving specific outcomes can be enabled either through survey functionality, or through such social networking tools as Facebook and Twitter. Such feedback can not only directly improve courseware materials, but the design of courses and course programs; and this data can be used to create course effectiveness scoring that links various users and user types together, creating “social scoring” that augments demographic data used to define effective educational programs.

True OBE: The Path Forward for Educators

There are many challenges in developing a framework for education that establishes standards-based outcomes for learners.

Where government-based mandates for educational standards exist – as is now the case across the U.S. in K-12 education because of such mandates as No Child Left Behind – disagreements between states (or even between local school districts) on what is to be taught, and how that subject matter is to be taught, invites wide disparities between outcomes from locality to locality.

In such politically charged disciplines as biology and history, mandates for what is to be taught can mean that students from different locations can finish their K-12 educations with widely different understandings of these subjects. These discrepancies can ultimately harm individual academic disciplines, and can make it difficult for schools to implement new technologies for learning, causing their students to lag behind the “cutting edge.”

In higher education, the adoption of technology enhanced learning (commonly referred to as TEL), the digital delivery of courseware that can most easily delivery standard-define outcomes for students, is hindered by the lack of defined

standards for those outcomes. Collaboration between institutions on improving the course of study for specific disciplines suffers because of lack of standardization. Students find it difficult to transfer from one university to another, because evaluation of where a student is in achieving desired outcomes in a discipline differs from one university to another. Sharing of educational content across institutions, and assessment and evaluation tools that weigh progress against desired outcomes, is made difficult if those institutions disagree on the outcomes to be enabled.

In response to these challenges in establishing outcome-based education, the European Community arm of the European Union established the ICOPER⁵ initiative in 2008, under the umbrella of the eContentplus program. ICOPER has the mission to collect, and further develop, best practices for higher education. It does so by examining issues such as learning design and teaching methods, authoring content to enable reuse, transferring knowledge in an outcome-oriented way, and evaluating all learning activities that lead to the accomplishment of outcomes in education.

The members of ICOPER see the benefits of an outcome-based approach to education to include:

- Outcome orientation helps to ensure consistency of course delivery within study programs.
- Outcome orientation highlights the dependencies between teaching, learning and assessing.
- Learning outcomes cascade from study program level to module and course levels, ensuring subject consistency and helping to identify overlaps.
- Outcome orientation empowers students to make more informed choices on study programs and learning paths.
- Outcome orientation increases transparency for different groups of stakeholders.
- Outcome orientation provides a better linkage between employment, vocational training and higher education.

To realize the benefits noted by ICOPER, and other industry bodies working to enable appropriate outcomes for all students, educational institutions must undergo profound changes in the processes used to educate and assess students, and the content they use to do so. Here are nine

initiatives educators must undertake to create a system of education that truly delivers outcomes for learners, the most important actor in the educational ecosphere.

- 1. Create a methodology and reference model** for competence-driven education that puts the concept of “shareable educational resource” at the center of outcome-based education. This model must support the development of interoperable systems and solutions; the reuse of processes, learning content and assessment tools; and the implementation of a service-oriented architecture that enables content interoperability across systems and applications.
- 2. Create a conceptual model** for outcome-oriented education that represents both dynamic phenomena – educational activity – and static phenomena (i.e., educational content). This conceptual model helps analysts in standardization bodies to understand the education domain; supports communication between developers of educational technologies and domain experts; and provides input into the design of data models, services and IT-supported processes.
- 3. Develop user scenarios and use cases** that reflect the usage of existing standards for learning outcomes, designs and teaching methods in the development of outcome-based applications.
- 4. Define processes for OBE** for all actors: the learner, involved in the planning of his/her education and the development of profile and personal data such as an achievement profile, as well the learning itself; the learning facilitator, who prepares and executes learning and assessment programs; and educational institution managers, tasked with the strategic analysis, planning and administration of the institution.
- 5. Define learning needs and learning opportunities.** A learning needs analysis analyses the needs of current or prospective students, and sets institutional strategy and goal setting based on those needs. Planning and management of learning opportunities turns strategies gained through learning needs analysis into action at the institutional and faculty level, developing curricula that ensure relevant learning resources, instructional models and learning outcomes.
- 6. Define instructional modeling processes** that instructors use to define the learning and assessment activities to be used in the development of a specific course, or program of courses, for a specific discipline. These models demonstrate and improve the alignment of an educational program’s outcome profile with the actual outcomes addressed through courses, and facilitate the sharing of best practices via instructional models.
- 7. Create processes for reusable learning content, through content** creation and management processes that promote its creation. To be truly reusable, content must be searchable (discoverable through search engines), accessible (metadata must enable indexing and content retrieval), available (licensing restrictions can’t prevent content reuse), addressable (content can be accessed through a recognized URL), interoperable (usable across different hardware and software), and durable (hardware or software changes can’t make content obsolete).
- 8. Create assessment processes** that lead learners to outcomes. This is important both to learners, who use assessment to appraise, qualify and certify personal achievement, and to educators, who not only define what the outcomes are but execute assessment to certify the outcome. Assessment processes must use formative feedback to help learners become aware of gaps that exist between desired goals and their current knowledge, and guide them through actions necessary to achieve the goal.
- 9. Create evaluation processes** appropriate to outcome-based education, to enable quality assurance in educational institutions. Such processes should support evaluation from an instructional modeling perspective, evaluating the teaching methods employed in courses and programs, to support the alignment of intended learning outcomes with teaching and assessment methods.

Footnotes

- ¹ For an introduction to outcome-based education, and some of the issues this model addresses, see the article "Outcome-Based Education: Critical Issues and Answers," written by William G. Spady for the American Association of School Administrators at <http://eric.ed.gov/PDFS/ED380910.pdf>.
- ² <http://www2.edu.gov/policy/elsec/leg/esea02/107-110.pdf>
- ³ http://www.astd.org/NR/rdonlyres/12ECDB99-3B91-403E-9B15-7E597444645D/23395/LMS_fieldguide_20091.pdf
- ⁴ "Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies," U.S. Department of Education, at <http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf>
- ⁵ <http://www.icoper.org>

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Charles Olson is a Senior Consulting Manager within Cognizant Business Consulting's Information, Media and Entertainment Practice. With 30-plus years of media industry experience, the last five and a half years at Cognizant, Charles is a recognized leader in designing workflows and the supporting taxonomic and metadata structures to move content from the analog world to the digital world. He has spoken at numerous industry events, including the Seybold Seminars, Nexpo, Content World and Internet World, and was a key member of the first work group developing the PRISM XML metadata standard for magazines. Charles began his career at the Minneapolis Star Tribune, where he was systems manager for newsroom technology and later held the same position at The Washington Post. He has also worked with Time Inc., Foreign Affairs, Houghton Mifflin Harcourt, Simon & Schuster, John Wiley & Sons and WGBH in Boston. Charles has a BA degree from St. Olaf College. He can be reached at Charles.Olson@cognizant.com.

About Cognizant

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