Instructional Design Standards for

Distance Learning

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Foreword

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In 1995, when Utah Gov. Mike Leavitt proposed the idea of an online university to the Western Governors Association, distance learning was not new, and even online learning was already taking place in a few settings. Since then, with the exception of a few growing pains, online learning has done nothing but expand. In the spring of 2017, when Purdue University acquired what remained of the for-profit Kaplan University, with an eye to folding it into a nonprofit institution, Purdue President Mitch Daniels claimed in an official statement, “None of us knows how fast or in what direction online higher education will evolve, but we know its role will grow.”

While that comment will no doubt continue to prove true from an institutional standpoint, the question of the quality of the online learning that takes place is still unanswered. One central reason that question remains apt is

that no *research-based standards for the design of online learning* exist. There are standards for content, and there are delivery standards as well. But there were no design standards for online learning.

The version of the standards presented here marks the beginning of what we hope will be an extended conversation. The standards began as a series of discussions between AECT staff and members about the large number of universities now developing online courses without the guidance of any research-based standards for designing online learning. Working from the extensive research literature on instructional design, two AECT members drafted the standards, and an edited version was approved by AECT's Executive Committee and shared with selected members of the Division of Distance Learning. Once all comments had been addressed, they were presented to the full Board of Directors, and they too approved them.

At this point, the authors of each of the chapters included in this publication were invited to flesh out the rationale for each standard. We approached Dr. Anthony Piña, Past-President of AECT's Division of Distance

Learning, to arrange for peer review of the chapters, serve as general editor and put them together in this publication.

We present them here as a way to start the conversation.

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Introduction

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Throughout my nearly three decades as a member of the Association for Educational Communications and Technology (AECT), I have heard the lamentations of my colleagues that principles of systematic instructional design and other principles that we hold dear have not made the impact into education at large that we have hoped. However, in both my current role as Associate Provost for Instruction and Online Learning at my institution and as a peer reviewer for the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), my experience is quite different.

In my efforts to affect "bottom-up" change at my institution, we established standards for online master courses that emphasized learning objectives as measurable student outcomes, assessment activities aligned with objectives, and instructional activities designed to bridge the gaps between objectives and assessments. I empowered my team of instructional designers to be able to enforce the standards for online master courses as they worked with our faculty subject matter experts. In other words, we pursued a course that is very familiar to those involved in AECT.

Our goal, of course, was to use the "bottom up" approach to influence our campus design culture--particularly for on-campus (i.e. face-to-face) courses. As with many institutions, our culture for many years had been

that on-campus courses were designed and developed by individual faculty members with little oversight and sometimes "in a vacuum." As a result, we had more inconsistent quality among our on-campus courses, that we did our online courses. Changing culture was a slow and laborious process—we met with opposition in some areas and were welcomed with open arms in others.

However, during the past few years, there has been a change that has facilitated greatly our efforts to diffuse instructional design across our entire institution. The change has come "top-down" in the form of calls from our regional and programmatic accrediting agencies and our state and federal regulators to realign our focus and reporting to student learning outcomes, assessment of outcomes and continuous improvement. Note the following items from the SACSCOC Proposed Revisions to the Principles of Accreditation:

> The institution identifies expected outcomes, assesses the extent to which it achieves these outcomes, and provides evidence of seeking improvement based on the analysis of the results in the areas below: (a) student learning outcomes for each of its educational programs; (b) student learning outcomes for collegiate-level general education competencies of its undergraduate degree programs; (c) academic and student services that support student success (SACSCOC, 2017).

The new "top-down" emphasis on measurable outcomes and assessment has been music to the ears of my instructional designers and me. As we prepared for our reaffirmation of

institutional accreditation, we saw the previous resistance to institution-wide adoption of instructional design principles quickly evaporate.

We had won after all!

I wish to thank Gary Morrison who got the instructional design standards project started and who invited me to subject chapters on resources and evaluation. I also wish to express my gratitude to Phil Harris who invited me to take over and run with this project.

Each of the chapters in this book underwent blind peer review by experienced professionals in instructional design and online education, including colleagues from the Division of Distance Learning of the Association for Educational Communications and Technology (AECT). I wish to express gratitude to Cassandra Black, Linda Campion, Jeffrey Corkran, Diane Curtis, Kathleen Decker, Yvonne Earnshaw, Peggy Muller, Megan Murtaugh, Ayesha Sadaf, Barry Sanford and Tony Stewart.

Finally--and especially--I wish to thank my colleagues Saul Carliner, Yuan Chen, Peggy Ertmer, Yi-Chun Hong, Judith Lewandowski, Michael Molenda, Gary Morrison, Jennifer Morrison, David Price, Jennifer Richardson, Steven Ross, Michael Simonson and Monica Tracy. They have given freely of the fruits of their experience and expertise and we are the beneficiaries of it in this volume. It is a special treat for me to have Wilhelmina Savenye as a contributor to this work. Willi mentored me as a doctoral student and she encouraged me to continue to pursue scholarly activities as my career led me into leadership and administration.

It is our hope that the AECT Instructional Design Standards for Distance Learning becomes a useful tool for our members, their institutions and others involved in educating learners at a distance.

Anthony Piña
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The Standards

Purpose. Effective course design begins with a clearly articulated purpose. This is the standard to which all other standards must align. Purpose may be thought of as two-dimensional: institution or instructor and student. The design should include both the purpose of the course as envisioned by the institution or instructor and the purpose as viewed by the student. As the purpose is articulated through goals and objectives, collaboration between instructor and student will set a firmer foundation than can be achieved through a one-dimensional purpose statement.

Assumptions. Course design must take into account assumptions that shape the purpose and subsequent course development. Most assumptions are based on students' prior knowledge and established understandings and skills. Articulating these content assumptions provides a starting point for new learning. Assumptions in the case of online learning also encompass students' ability to use delivery technology.

Sequence. Learning opportunities must be sequenced in a manner that promotes efficient knowledge acquisition consistent with the prior-knowledge assumptions. Various models of sequencing—linear, spiral, scaffold, etc.—should be considered, and the course design should incorporate those strategies best suited to the content within the constraints of online delivery.

Activities. Learning is achieved through activities both passive (reading, listening, viewing) and active (experimenting, rehearsing, trying). Activities should be chosen that best suit the content, students' levels of

knowledge, experience, and ability, and online delivery constraints, particularly accommodating synchronous, asynchronous, and mixed course participation. Student self-selected or self-developed learning activities should be incorporated along with instructor-selected and instructor-developed activities, consistent with a two-dimensional purpose.

Resources. A range of resources should be articulated to foster deep learning and extend course-centered experiences and activities. Resources should be multimodal to accommodate students' interests, understandings, and capacities, consistent with course content and technological accessibility. Resources should allow students to go beyond the constraints of the formal course structure to engage in self-directed, extended learning.

Application. Consistent with providing for active learning, students should have integral opportunities within the course design to apply new learning. Effective course design incorporates opportunities to practice newly acquired understandings and skills, both independently and collaboratively. Online collaborative application opportunities should be developed using social media, and offline collegial groups also should be structured whenever physical proximity of students affords this opportunity.

Assessment. Regardless of the model of sequencing learning opportunities, the sequence should include points of assessment for purposes of feedback and review, with instances of re-teaching as necessary for students to acquire full understanding. Formative assessment, whether formal, informal, or incidental, allows teachers and students to give feedback to one another and to review the operationalized design in order to revise the course design based on

students' input with regard to knowledge acquisition and effective use of new understandings and skills.

Reflection. Effective course design must include opportunities for reflection as an extension of the Feedback/Review/Reteach standard. Reflection involves both instructor self-reflection and student self-reflection related to achievement of the purposes that have been articulated as the basis for the course. Such reflection is intended to deepen the learning experience and may serve as reiteration of purpose at key points during the course.

Independent Learning. Effective course design incorporates opportunities for independent learning, both instructor- and self-directed. Online course development, particularly in the asynchronous mode, should epitomize independent learning, which should include opportunities for feedback, review, and reflection—all of which should resonate with the purpose.

Evaluation. Course evaluation must be purpose-driven. Alignment with the purpose should be threefold: a) based on acquisition of new knowledge, understandings, and skills; b) based on instructor self-evaluation; and c) based on student self-evaluation. Multidimensional evaluation offers a fully articulated basis for judging the success of the course and the students as well as providing information that can help shape future iterations of the course.

Purpose

Michael Molenda

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Effective course design begins with a clearly articulated purpose. This is the standard to which all other standards must align. Purpose may be thought of as two-dimensional: institution or instructor and student. The design should include both the purpose of the course as envisioned by the institution or instructor and the purpose as viewed by the student. As the purpose is articulated through goals and objectives, collaboration between instructor and student will set a firmer foundation than can be achieved through a one-dimensional purpose statement.

Background

"Purpose"--usually referred to as goals or objectives--has been the keystone of curriculum development and instructional development since the birth of modern curriculum development theory. Early in the 20th century. Franklin Bobbitt and Werrett Charters were colleagues in educational administration at the University of Chicago, and both were influenced by the scientific revolution being wrought in academia, business, and government. In the early 1920s, both Bobbitt (1924) and Charters (1925) published major books on curriculum development. Both advocated strongly for the use of

objectives as the foundation stones of school curricula, arguing that useful objectives could be derived through systematic analysis of society's industrial needs and social requirements. What's more, the form of the objectives statements they supported is not substantially different from what is being recommended today.

Ralph Tyler, who studied under Charters at University of Chicago and later worked with him at Ohio State University, applied the scientific approach to the improvement of instruction at the university. In the 1940s, Tyler became the spokesman for the scientific approach to curriculum development, exemplified in his concise classic, *Basic Principles of Curriculum and Instruction*, first published locally in 1949, and then republished as a mass-market paperback in 1969. In it, Tyler enunciated the logical framework that still informs today's educational practice:

> The rationale developed here begins with identifying four fundamental questions which must be answered in developing any curriculum and plan of instruction. These are:
>
> 1. What educational purposes should the school seek to attain?
> 2. What educational experiences can be provided that are likely to attain these purposes?
> 3. How can these educational experiences be effectively organized?
> 4. How can we determine whether these purposes are being attained? (Tyler, 1969, p. 1)

These four questions are congruent with the four steps in curriculum construction proposed by Charters in 1925: “selecting objectives, dividing them into ideals and activities, analyzing them to the limits of working units, and collecting methods of achievement” (p. 101). Bobbit, Charters, and Tyler all propose that objectives are the “stake in the ground” around which other curricular/instructional decisions revolve. Indeed, now, nine decades after Charters and six decades after Tyler, educators have come to a firm consensus that instructional quality rests on the mutual alignment of objectives, learning activities, and evaluation activities.

Objectives drew heightened attention in the early 1960s as such behaviorist technologies as programmed instruction gained popularity in education and training. Behaviorist technology depends on clear and precise specification of desired terminal behaviors, so advocates devoted entire monographs to just this topic, exemplified by Robert Mager (1962a, 1962b). By the time of Ivor Davies’ writing in 1976, there was enough field experience and research to fill a book with advice on the subject (Davies, 1976).

Attention to objectives has not waned in the succeeding generations. If anything, the centrality of objectives has become even more widely accepted. For example, in their guide for corporate trainers, Stolovitch and Keeps (2002) condense their advice into five steps that clearly focus on objectives: 1) tell the learners the rationale for the lesson, 2) tell them the objectives of the lesson, 3) create learning activities that lead to attaining the objectives, 4) evaluate learner performance, and 5) provide feedback on how well they mastered the objectives.

Relevance to Instructional Development

Jere Brophy probably makes the clearest, most succinct case for the centrality of objectives for instructional designers:

> The key to making learning experiences worthwhile is to *focus your planning on major instructional goals, phrased in terms of desired student outcomes*—the knowledge, skills, attitudes, values, and dispositions that you want to develop in your students. Goals, not content coverage or learning processes, provide the rationale for curriculum and instruction. (Brophy, 2010, p. 33)

Although it may seem so to educational technology professionals, the necessity of clearly stating objectives is not intuitively obvious to most teachers. Indeed, according to Clark and Peterson (1986), "Teachers typically plan by concentrating on the content they will teach and the activities their students will do, without giving much thought to the goals that provide the rationale for the content and activities in the first place." In short, objectives communicate to learners what is critical and what is peripheral and clarify what is expected; they guide the choice of learning activities; they facilitate the selection of materials; and they provide the keys to the development of evaluation activities and items

Relevance to Distance Learning

For several reasons, clear enunciation of purposes, goals, and objectives may be even more crucial to distance education than to face-to-face instruction. First, given that distance learners are often seeking specific credentials or job skills, it is consistent with "truth in advertising" to be explicit about what learning outcomes they can expect from a distance education course or module.

Second, in distance education, instructors usually have little basis for evaluating student performance other than through their work products (papers, projects, examination answers). In the face-to-face classroom, instructors have a lot of other information about a student's attendance, attentiveness, responsiveness, contribution to group discussion, and so forth. Hence, it is even more important to be clear about exactly how the distant student will be evaluated. Explicit objectives will also help hold the instructor accountable for providing the resources, learning experiences, and feedback necessary for students to reach the stated learning outcomes. In pre-packaged modules delivered online--as opposed to conventional classroom teaching--it is much more difficult to go back and fill in with extra resources or exercises when instructors begin to sense that students are struggling.

Third, in distance education, learner autonomy and learner control loom as larger issues than in traditional instruction (Shearer, 2003). If the distance learning environment is too structured and rigid, the life demands experienced by learners may leave them feeling forced to drop out. If he environment is too loosely structured, distance learners may struggle to find their footing. Clear statements of objectives contribute to a predictable and controllable environment.

Empirical Support for the Value of Objectives

Ideally, one would like research to answer the question: Does stating objectives makes the rest of the development process faster or easier for the developer, or make the final product more successful? Conducting a study to answer this question with any level of generality would require samples, procedures, and controls that are difficult to achieve. One study that involved eight teacher-designers and their fourth-grade classes compared student achievement on a science unit (Sullivan, Lievens, Villalpando, and Watkins, 1986). Half the teacher-designers created lessons based on specific instructional objectives. Their students performed significantly better, both on the post-test and on attitude toward the topic, indicating that designers guided by specific objectives create more effective and more appealing lessons.

Value for Designers

In addition, there have been some large-scale studies and research syntheses that cast *some* light on the value of objectives to designers. First, do experienced instructional developers actually make the effort to write specific objectives? A survey of training professionals revealed that 94% "regularly" wrote out specific objectives (and 82% "always" did so), a higher percentage than any other step in the instructional design (ID) process.

Next, if designers do state objectives, are those objectives appropriate? And are they reflected in the learning activities and evaluation items created in the design process? A large-scale evaluation study was conducted with the U.S. Navy's extremely detailed ID procedures, which are designed to be used by instructors

untrained in ID (Taylor and Ellis, 1991). After evaluating 100 courses, they found that: 1) most objectives were appropriately stated, at least in terms of the "action" component; 2) nearly half the instructional activities failed to provide appropriate practice; and 3) nearly half of all test items failed to align with objectives. While this study does not answer the question about the utility of objectives, it does cast some light on the pitfalls of trying to improve instructional quality by developing ever more detailed design procedures.

One of the early literature surveys on instructional development (McCombs, 1986) highlighted the problem of "overproceduralization." That is, when following a systematic procedure, it is easy for users to fall into the practice of using the procedure as a recipe with steps to be done in a routine, unthinking manner (for example, filling in objectives statements after the lesson is completed), rather than viewing instructional development as a complex, creative process. Shrock (1985) also identified similar misunderstandings of ID procedures among college faculty members who were novices to ID.

Value for Learners

As meta-analyses of educational research have become more and more common, a clear consensus has emerged that specifying learning goals or objectives does have a measurable impact on student achievement. For example, in their synthesis, Beesley and Apthorp (2010) conclude, "All studies produced positive effects for objective setting with an overall effect of g = 0.31" (p. 109), which Hattie (2009) would rate "medium" on the scale of low to high impact. An earlier synthesis of research found that "goal setting on intended outcomes" achieved an even higher effect size of 0.40 (Walberg, 1999, p. 80).

One of the earliest meta-analyses reached a similar conclusion. In their study of techniques in science teaching, Wise and Okey (1983) found an effect size of .57 (p. 430), which would rate as "medium" impact on Hattie's scale. This was for the variable they term "focusing," by which they mean "where something occurs to alert students to the objectives or intent of instruction. Focusing techniques may be employed before, during, or after instruction" (p. 421). Interestingly, Hattie's own synthesis of meta-analytic studies (2009) arrived at virtually the same effect size for what he terms "goals," a subset of "learning intentions." In all of these studies the authors are referring to instructional strategies in which learners are informed of the specific intent of their lessons.

Why Objectives Are Valuable

First, as pointed out by Wise and Okey, objectives help students narrow their focus to that which is most important. Second, goals are motivational. Contemporary theories of motivation emphasize facilitation rather than control of behavior (Pintrich & Schunk, 2002). The aim is to encourage learners accept the goals and to believe in their ability to achieve them. Third, objectives are indispensable to effective practice-and-feedback. Indeed, there are few instructional strategies proven to be more powerful than providing informational feedback as students practice new skills. Hattie's synthesis of meta-analyses on feedback (Hattie, 2009) yields an effect size of 0.73, placing this strategy in the range of "high" impact. Since feedback means information about progress *toward an objective*, it is axiomatic that there must be explicit objectives to start with.

Features of Well-Stated Objectives

Specificity

Dean, Hubble, Pitler and Stone (2012) counseled course designers to "Set learning objectives that are specific but not restrictive" (p. 5). Marzano, Pickering, and Pollock (2005) agree and delve further into whether objectives can be "too specific." Their meta-analysis of research on objectives concludes that highly specific behavioral objectives have an effect size of only 0.12—very low impact. They speculate that using highly detailed and technical language may inhibit students from internalizing and personalizing such objectives.

Meaningfulness

One of the truisms of modern educational philosophy is that learners will invest more effort in pursuit of goals that are relevant to them. This principle is well supported by current meta-analyses of educational research, which indicates that instruction should "Engage students in setting personal learning objectives" (Dean et al., 2012, p. 9).

According to motivation theory, goals are more likely to be activated if they are salient to the individual (Pintrich and Schunk, 2002). Salience may have many dimensions: seeing the connection between today's lesson and past and future lessons, perceiving the goal to be within learners' capability, compatible with their cultural background, and useful in their future life, among others. Objectives statements that are personally relevant are more likely to stimulate learner effort. Learners' "ownership" of objectives seems to increase their commitment to achieving those objectives. The importance of commitment in

achieving goals is well established in the literature of organizational development (Locke and Latham, 1990).

One way to make learner commitment explicit is to employ learning contracts, in which the learners agree to create some learning product, such as an essay, in return for a passing grade or other reward controlled by the instructor. The reward could be some form of public recognition, as advocated by Marzano (2007) under the rubric of a "celebration" marking progress toward a larger goal.

Difficulty

This principle was first established in laboratory studies of job performance by Locke and Latham (1984) and later verified in field studies. They found that "people who were assigned difficult goals performed better than did those who were assigned moderately difficult or easy goals" (p. 10). Hattie (2009) found a high positive correlation between goal difficulty and student performance and speculated that difficult goals "lead to a clearer notion of success and direct the student's attention to relevant behavior or outcomes" (p. 164). This finding is reflected in a 2007 review of research on feedback, which shows that feedback is most helpful when "goals are specific and challenging but task complexity is low" (Hattie and Timperley, pp. 85-86).

Summary

Although we lack abundant research evidence that specifying objectives ensures an efficient and effective instructional development process, we have ample evidence that the provision of goals and objectives to learners enhances achievement. In the end, the strongest argument for objectives is the compelling logic that one can hardly

begin to create learning materials or assessment measures without first having carefully prescribed the intended outcomes of the lesson, whether face-to-face or at a distance.

References

Beesley, A. D., & Apthorp, H. S. (Eds.) (2010). *Classroom instruction that works, 2nd ed., research report.* Denver, CO: McREL Inc.

Bobbitt, F. (1924). *How to make a curriculum*. Boston: Houghton Mifflin.

Brophy, J. (2010). *Motivating students to learn* (3rd ed.). New York: Routledge.

Charters, W. W. (1923; rpt. 1925). *Curriculum construction*. New York: Macmillan.

Clark, C., & Peterson, P. (1986). Teachers' thought processes. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 255-296). New York: Macmillan.

Davies, I. K. (1976). *Objectives in curriculum design*. London: McGraw-Hill.

Dean, C. B., Hubble, E. R., Pitler, H., & Stone, B. J. (2012). *Classroom instruction that works: Research-based strategies for increasing student achievement* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development; and Denver, CO: McREL.

Hattie, J. (2009). *Visible learning*. London and New York: Routledge.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of educational research, 77*(1), 81-112.

Locke, E. A., & Latham, G. P. (1984). *Goal setting: A motivational technique that works.* Englewood Cliffs, NJ: Prentice-Hall.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall.

McCombs, B. L. (1986). The instructional systems development (ISD) model: A review of those factors critical to its successful implementation. *Educational communication and technology journal, 31*(4), 187-199.

Mager, R. F. (1962a). *Preparing objectives for programmed instruction*. San Francisco: Fearon.

Mager, R. F. (1962b). *Preparing instructional objectives*. Belmont, CA: Fearon

Marzano, R. J. (2007). *The art and science of teaching*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2005). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Upper Saddle River, NJ: Pearson Education.

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education: Theory, research, and applications* (2nd ed.). Upper Saddle River, NJ: Pearson Education.

Shearer, R. (2003). Instructional design in distance education: An overview. In M. G. Moore and W. G. Anderson (Eds.), *Handbook of distance education*. Mahwah, NJ: Lawrence Erlbaum Associates.

Shrock, S. A. (1985). Faculty perceptions of instructional development and the success/failure of an instructional development program: A naturalistic study. *Educational communications and technology journal, 33*(1), 16-25.

Stolovitch, H. D., & Keeps, E. J. (2002). *Telling ain't training*. Alexandria, VA: American Society for Training & Development.

Sullivan, H. J., Lievens, R. C., Villalpando, E. M., Marquez, C., & Watkins, G. (1986). Supplementing

traditional instruction with objectives-based instructional development. *Journal of instructional development, 9*(2), 29-32.

Taylor, B., & Ellis, J. (1991). An evaluation of instructional systems development in the Navy. *Educational technology research and development, 39*(1), 93-103.

Tyler, R. W. (1949; rpt. paper 1969). *Basic principles of curriculum and instruction.* Chicago: University of Chicago Press.

Walberg, H. J. (1999). Productive teaching. In H. C. Waxman and H. J. Walberg (Eds.), *New directions for teaching practice and research.* Berkeley, CA: McCutchan.

Wedman, J., & Tessmer, M. (1993). Instructional designers' decisions and priorities: A survey of design practice. *Performance improvement quarterly, 6*(2)*,* 43-57.

Wise, K. C., & Okey, J. R. (1983). A meta-analysis of the effects of various science teaching strategies on achievement. *Journal of research in science teaching, 20*(5), 419-435.

Assumptions

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Course design must take into account assumptions that shape the purpose and subsequent course development. Most assumptions are based on students' prior knowledge and established understandings and skills. Articulating these content assumptions provides a starting point for new learning. Assumptions in the case of online learning also encompass students' ability to use delivery technology.

Background

An assumption is a position taken until something is proven. Stated another way, assumptions are ideas without evidence--things taken for granted. Assumptions seem to be the antithesis of the systems approach and systematic design of instruction. After all, the systems approach is based on a premise that aspects of any system should be correctly defined, clearly understood, and well-documented. Distance education programs are usually planned using the systems approach (Dick, Carey & Carey, 2015; Simonson, Smaldino & Zvacek, 2015).

Instructional designers may not like to talk about assumptions or discuss what they take for granted. However, in the privacy of the design studio, everyone who plans instruction, both face-to-face and online, makes

assumptions and takes things for granted. But let us look at the types of assumptions that form the basis for designing instruction, with an emphasis on online instruction. There are seven broad areas where assumptions guide instructional design, at least initially:

1. Learners
2. Structure
3. Communication
4. Technology
5. Interaction
6. Literacy (visual and verbal)
7. Learning

Assumptions About Learners

Assumptions about learners are those things that are taken for granted about them. Standards for online instruction often begin with the designers listing the characteristics of the target audience for the instruction, such as: prerequisite competencies, access to resources, and level of self-motivation. The massive body of research provided by those advocating for mastery learning during the 1950s and 1960s provides guidance about learner assumptions (Saettler, 2004). One assumption, later supported by research, was the idea that any communication between a student and an instructor must be based on what both have in common: language, background, interests, motivation, and so on. All models of communication require assumptions about what the sender of a message and the receiver of the message have in common (Simonson, 1984).

Assumptions About Course Structure

One of the first decisions that online designers must make regards time: individualized or personalized instruction holds learning outcomes constant and allows for variations in time (i.e., students have as much time as they need to meet a course's learning outcomes). Most often, however, distance education is time bound (the 15-week semester or the eight-week term, for example). Once the time issue is resolved, then the structure of the learning experience is decided. At this point, decisions about learning theory must be made. Will the course be built on behaviorism, constructivism, or combinations of theories? A comprehensive review of online courses and programs shows that behaviorism-based course structures dominate (Simonson, Smaldino & Zvacek, 2015). Courses organized around weeks or units/modules/topics are most common. Decisions about structure are usually decisions made according to assumptions, that is, without direct evidence of their efficacy.

Assumptions About Communication

Early on, the designer makes decisions about how communication between the instructor and students should occur and whether this communication should be asynchronous or synchronous (Orellana, Hudgins, & Simonson, 2009). There is evidence available to help designers make these decisions, but prescriptive evidence is largely lacking, and the assumptions about communication are generally made based on prior experience or personal preferences. The evidence does support one trend: novice distance educators design their courses with considerable live communication, while more experienced distance educators opt for asynchronous communication (Simonson, Smaldino & Zvacek, 2015).

Assumptions About Technology

It is hard to imagine online instruction without instructional technology, so one immediate assumption is that online course design and delivery must be instructional technology-based. The types of communication technology and instructional technology to be used grow out of a critical set of decisions that are made early in the design process (Dick, Carey & Carey, 2015).

Assumptions About Interaction

The U.S. Department of Education states that distance education must provide for regular and substantive interaction (U.S. Department of Education, 2017). Both words – regular and substantive – are vague and open to interpretation. In other words, assumptions must be made. Recently, some--including MOOC supporters--have advocated the idea that interaction is no longer necessary and is an outdated concept. Others, however, think that the entire distance education experience should begin with provisions for interaction (Simonson, 2015). The designer of online instruction must make decisions about how interaction is to take place, and standards for online education should have clear guidelines about interaction.

Assumptions About Visual and Verbal Literacy

Dwyer's research on relevant cues (Moore & Dwyer, 1994) and Dale's realism theory (Dale, 1946) indicate that decisions about text, pictures, video, and graphics are critical in any instructional design activity. The individual or team who creates online instruction needs to make many decisions about literacy and how the selected

medium supports the delivery and understanding of content. It is clear that Clark (2012) was correct: media do not directly influence achievement. But it is also a basic assumption that, without employing some medium of communication, it is nearly impossible to communicate at a distance. Thus designers may make assumptions related to the literacy—both visual and verbal--of all learners involved in distance education.

Assumptions About Learning

Actually, this is the most straightforward category of assumptions that affect the standards for the design and delivery of online learning. It is clear that 90% of any content area can be successfully learned by 90% of any group of learners, given enough time (Saettler, 2004). However, the six areas of assumptions listed previously all support the assumption that online students will learn. This assumes that the assumptions are correct.

Summary

An initial design step, and eventually a design standard for online instruction, should be for the project manager to list the assumptions that are at the foundation of the instructional design plan. Assumptions can be organized into the categories listed here and presented as part of the design plan. Finally, designers of online instruction can, indeed must, make assumptions. Scientists interested in distance education should conduct research on those assumptions so they become standards--expectations that must be met. Standards without such research will remain assumptions only--ideas without evidence.

References

Clark, R. (2012). *Learning from media.* (3rd ed.) Charlotte, NC: Information Age Publishing.

Dale, E. (1946). *Audio-visual methods for teaching*. New York: Dryden Press.

Dick, W., Carey, L., & Carey, J. (2015). *The systematic design of instruction,* (8th Ed.). Boston, MA: Pearson.

Moore, D., & Dwyer, F. (1994). *Visual literacy: A spectrum of visual learning*. Englewood Cliffs, NJ: Educational Technology Publications.

Orellana, A., Hudgins, T., & Simonson, M. (2009). *The perfect online courses: Best practices for designing and teaching*. Charlotte, NC: Information Age Publishing.

Saettler, P. (2004). *The evolution of American educational technology*. Charlotte, NC: Information Age Publishing.

Simonson, M., Smaldino, S., & Zvacek, S. (2015). *Teaching and learning at a distance: Foundations of Distance Education*, (6th Ed.). Charlotte, NC: Information Age Publishing.

Simonson, M. (2015). Regular and substantive. *Distance Education, 12*(4), 68-67.

Simonson, M. (1984). *Media planning and production*. Columbus, OH: Merrill.

U.S. Department of Education (2017). Accreditation in the United States. Retrieved from https://www2.ed.gov/admins/finaid/accred/accreditation_pg12.html.

Sequence

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Learning opportunities must be sequenced in a manner that promotes efficient knowledge acquisition consistent with the prior-knowledge assumptions. Various models of sequencing—linear, spiral, scaffold, etc.—should be considered, and the course design should incorporate those strategies best suited to the content within the constraints of online delivery.

Background

When designing instruction, for any type of delivery, but especially for online learning, how to sequence instruction may seem to be a deceptively simple step. However, sequencing instruction for effective student learning involves a very important set of decisions that are made at several levels and stages of design. Morrison, Ross, Kalman and Kemp (2013) define sequencing as "the efficient ordering of content in such a way as to help the learner achieve the objectives in an efficient and effective manner" (p. 122). Instructors or designers may typically begin developing instruction by using the sequence provided in textbooks or other available materials; however, after one or two times using these materials, they often find that the sequence does not work for their particular learners.

At the outset let us suggest that a simple approach to sequencing might be used when time is short, when instruction will be offered only once or only for few learners, or when risks and costs of failed instruction are low. In these cases, sequencing may be based upon: 1) knowledge about the learners and 2) going from easy to more difficult or simple to more complex. However, this simplistic approach is not optimal in many cases, particularly for complex learning or large-scale, high-impact, or extremely important instruction. In such cases, a deeper view of developing instructional sequences is needed.

Keller and Suzuki (2004) remind us of the critical importance of motivation to learn in E-learning design, noting, “First, a lesson must gain and sustain a learner’s attention” (p. 231). In the ARCS model for motivation, Keller (2010) recommends strategies for not only gaining attention, but for supporting learners’ perceptions of the relevance of the instruction, as well as their confidence and satisfaction in learning the material. Keller and Suzuki and others (cf. Sullivan & Higgins, 1983) have suggested that a motivator addressing at least one aspect of ARCS, based on knowledge of the learners, be included early on in any instructional lesson. Motivators are often included in a lesson introduction; however, they may be included at any point in instructional sequences.

Where Sequencing Fits in the Design of Online Learning

We argue that it is best to design instruction, but especially online learning materials, using a systematic

approach overall. There are many models for designing instruction. For instance, as early as 1980, Andrews and Goodson reviewed over 60 instructional design (ID) models. More recently, Branch and Kopcha (2014) have indicated that there are now hundreds of ID models. If we look to simplify, one model, called ADDIE, aids designers by suggesting five major steps to designing learning materials: analyze, design, develop, implement, and evaluate (Branch, 2009).

Several widely-used instructional design models enable us to look more deeply at what goes into developing instruction. For instance, Dick, Carey & Carey (2005) suggest that the instructional designer begins by identifying instructional goals, which is followed by conducting an instructional analysis and identifying entry behaviors. A critical next step is writing learning/performance objectives. In this model for designing instruction, developing tests to measure student performance on the objectives usually comes next, followed by designing the instructional strategy, developing and selecting instructional materials, and conducting formative evaluation. Based on the results of the formative evaluation, revisions are made to the materials before implementing the learning materials. For Dick, Carey, and Carey, sequencing of instruction would take place when writing objectives, when developing strategies, and when developing the instructional material.

Morrison et al. (2013) have developed a more circular ID model, in which the early steps are somewhat different. These authors suggest that an instructional project begins by identifying an instructional need by conducting a needs assessment. They then recommend analyzing the characteristics of the target learners. Analyzing the learners cannot be shortchanged, as the lesson or unit may otherwise

fail to meet the needs of those for whom it is intended. Many decisions in designing the instruction rest upon the knowledge of the learners' age, performance needs, backgrounds, interests, and, most important, levels and types of prior knowledge and skills related to the content. Smith and Ragan (2004) would add that the "context" – that is, where and how the instruction will be delivered – should also be analyzed early on.

The next crucial step, upon which the foundation of the instruction rests, is writing a set of student learning objectives (which may also be called performance objectives, learning outcomes, etc.). For Morrison et al. (2013) sequencing of content is best done right after developing objectives, though again, their model is iterative and circular, indicating that steps often can be completed in different orders and that decisions made early on are subject to change throughout the design process.

Levels of Sequences in Instruction

There are several levels of sequences to consider in designing learning materials. Gagne, Wager, Golas and Keller (2005) note that sequencing of instructional content needs to be done at several levels, depending on the length of the instruction. These authors provide guidance for making sequencing decisions at the following levels:

- Course
- Topic or unit
- Lesson
- Lesson component or objective

Gagne et al. (2005) remind us that what makes up a course can vary in many different learning contexts. For example, in a university setting a course may be completed

in 5 weeks, 8 weeks, 10 weeks, or 15 weeks. However, in other adult learning settings, such as in training, a course might be completed in a few hours. Typically, however, a course would consist of several lessons, which each would be designed to teach learners to achieve several objectives.

Designers may use tools to help plan and sequence a large course or set of courses at a macroscopic level. One common planning tool is a "scope and sequence matrix" (Gagne et al., 2005, p. 175). This is a table in which the course planners develop content topics on one axis with key objectives on the other.

Another tool that can be used at many levels of sequencing is the Instructional Curriculum Map (ICM) (Gagne et al., 2005, p. 178). An ICM may be developed to show the basic units or topics in a course and how they lead to subsequent topics, ultimately leading to the end-of-course culminating unit or skill. After the overall topics or units in a course have been identified, a detailed ICM can be developed for each unit in the course, showing the key objectives and how they lead to the other key objectives in a unit. ICMs can also be developed for each level (some call this lesson mapping).

Approaches to Sequencing

Not surprisingly, there are several types of approaches that designers may apply when planning how to sequence instruction. A tour of these approaches may make planning a course or unit easier. Posner and Strike (1976) suggest that methods for sequencing learning content fall into five categories, though they also note that these categories may certainly overlap. These are:

- Learner-related
- World-related
- Concept-related
- Inquiry-related
- Utilization-related.

Learner-Related

Learner-related sequencing is highly learner-centered and rests upon psychology of learning theories. Based on the knowledge about the learners gained by doing the learner analysis mentioned above, designers may employ one of several methods. They may identify "empirical prerequisites," typically related to skills that need to be learned before other skills. Knowledge of the learner leads the designer to build sequences from what is familiar to the learner to that which is unfamiliar. Another method would move from less to more difficult, again, from the perspective of the target learners. Sequencing based on the interests of the learners, with more interesting first, is another method, as is sequencing based on the learners' developmental levels. Finally, particularly useful for teaching attitudes is to develop instruction to help learners increasingly internalize the attitude or position.

World-Related

World-related sequencing involves analyzing the actual relationships that occur in the world and ordering material accordingly. Depending upon the instructional problem, such sequencing might be based on space/spatial relations, time/temporal relations, or physical characteristics or features of the phenomena to be taught.

Concept-Related

According to Posner and Strike (1976), concept-related sequencing is a type of logical ordering of content particularly adaptable to teaching concepts and propositions. Concept-related sequencing includes four subtypes or principles for ordering instructional content. One is based on class relations; Morrison et al. (2013) suggest that characteristics of a class be taught first, for example. In contrast, sequencing using propositional relations involves teaching examples first and then the proposition. A third method for concept-related sequencing, according to Posner and Strike (1976), is by level of sophistication of the concepts, that is simpler to more complex or concrete to more abstract. Finally, sequencing based on logical prerequisites is used when a concept must be understood that is a prerequisite of another concept.

Inquiry-Related

Inquiry-related sequencing is employed when a more discovery-oriented approach to instruction is desired or when the nature of the learning involves "generating, discovering, or verifying knowledge" (Posner & Strike, 1976, p. 676).

Utilization-Related

Utilization-related sequencing is often used for organizing content for three contexts: social, personal, and career (Posner & Strike, 1976). For these contexts, sequencing content can be done according to procedures that need to be learned, such as steps in a training process, or according to how frequently the content to be learned would be used. That might involve teaching content that is most important or most frequently used first.

Learning Hierarchies Approach

Gagne et al. (2005) emphasize a learning hierarchies approach to sequencing learning content, though they acknowledge that there are many ways to conduct sequencing. Designers first analyze the major course, unit, and lesson objectives and classify the objectives into "domains of learning." These include: verbal information, such as facts or bodies of knowledge; cognitive strategies, which may be thought of as skills involved in learning how to learn or remember; motor skills; attitudes and intellectual skills. For example, because intellectual skills usually build upon each other, discriminations need to be learned before concepts, concepts before rules, and rules before principles or higher-order rules.

Learning hierarchies are especially applicable when designers determine that many of the course objectives represent intellectual skills, as these clearly build upon one other. Designers analyze what are the prerequisite skills learners need before learning the entry skills in the course; they then may build curriculum maps, as described above, that show which concrete and abstract concepts must be learned before students may learn to apply rules that involve those concepts and which rules and principles must be learned before students can learn to solve problems involving those rules. Gagne et al. (2005) and Smith and Ragan (2004) provide extensive guidance, based on a great body of research on learning, for strategies for developing instruction to teach all these domains of learning outcomes.

Knowledge-Based Sequencing

According to Gagne et al. (2005), knowledge-based sequencing leads us to consider design of more technology-

based instruction, especially if designed for self-instruction via online technologies. A designer analyzes the optimum path for a learner through the instruction, developing not just guidance and content, but also ways for the student to practice skills, apply knowledge, and receive individualized feedback. Though not typically employed by online instructors for groups, a designer could build a module for a course that would include alternative paths through the instruction, based either on learners' choices or on their performance.

Spiral Sequencing

The types of sequencing of content described above might be considered somewhat linear. A very different approach to sequencing is based on the idea of spiral sequencing of content. One might visualize a spiral with instruction that begins at the base and moves upward through topics. The topics are revisited throughout the course, at deeper and deeper levels. Gagne et al. (2005) contend that spiral sequencing is particularly common in language courses and in vocational courses. In language courses, they suggest that objectives involving vocabulary, pronunciation, and grammatical rules are learned at increasingly more complex levels. They add that spiral sequencing in language courses allows for many opportunities for learners to practice their language skills.

Elaboration Theory

Like spiral sequencing, elaboration theory organizes instruction from simpler to more complex knowledge. Reigeluth (1987) uses an analogy of a camera zoom lens to illustrate the elaborative sequence. When provided with a photo, viewers start with a wide-angle view, which allows them to see the major components of a picture and the

interrelationships among those components. After obtaining a broad view of a picture, viewers then zoom in to focus on the details of a specific component, followed by a zoom out to a wide-angle view. Viewers then continue this pattern until they obtain both the whole picture and the details of components. Applying this notion, the learning of complex knowledge can be supported by designing instruction to proceed from the broadest, most general, and most inclusive idea toward narrower, more precise, and less inclusive ideas in order to assist learners to obtain both the breadth and depth of knowledge.

Reigeluth (1999) further identifies three types of elaborative sequence for teaching different types of content: conceptual elaboration, theoretical elaboration, and procedural elaboration. The conceptual elaboration sequence aims to teach topics with interrelated concepts, while the theoretical elaboration sequence is intended for organizing a set of interrelated principles. The interrelated concepts and principles can be structured into a concept map. Based on the concept map, designers then use the top down approach to choose the more general, superordinate concept or principle to be taught first and then gradually progress toward more detailed, subordinate concepts or principles. In some cases, the focus of the instruction rests on the procedural knowledge (e.g., how to plan a trip). The designers then can apply the procedural elaboration sequence and to teach the simplest version of a task (e.g., plan a day trip) and then gradually add other components to prepare learners for more complex version of the task.

Online Settings

Online learning has various forms, including but not limited to Web-based learning, e-learning, distance learning, and computer-assisted learning. No matter which

form of online learning is developed, applying sequencing strategies is arguably at least as important in online courses, as in traditional, face-to-face courses. Online learning requires additional planning up-front because of the distinct natures of online learning environments and the affordances of technologies. Technology affordance, according to Gagne et al. (2005), refers to the functions of technology that increase the potential for enhanced learning. Some technologies afford instant and ubiquitous access to learning resources and materials. Some enable learners to connect with a geographically diverse student body. Other aspects of technologies afford learners access to learning materials and activities at their own pace. Ally (2008) identifies that one type of interaction in which students engage in an online learning environment is that of learner-content interaction, which provides opportunities for learners to navigate on their own from the first to the last learning episodes.

Echoing the value of learner control, Alessi and Trollip (2001) offer several concrete recommendations. Designers should carefully design the opportunities for learners to control their learning speed, moving forward, pausing, and even moving backward as needed; the opportunities for accessing all topics or partial topics on the learning menu; and the opportunities to skip learning materials when necessary. With the affordances of technology, designers and instructors are able to design completely personalized learning environments; however, this may considerably increase development time and cost.

No matter what approach a designer/instructor uses to develop the sequence of content and learning objectives, it is always wise to make a bit of time to conduct a formative evaluation of the instruction. For instructors, this may be the first time they teach a course or unit, and for

designers, this may be a small-scale tryout with a group of sample learners, before the course is fully implemented. Data can be easily collected regarding student mastery of the learning objectives, as well as their attitudes toward the instruction, with revisions being made before the next iteration of the course.

Summary

Many approaches to sequencing instructional content are available. However, a designer or instructor will have the most impact on learners by employing a systematic approach to designing instruction. Sequences based on applying the data from a needs assessment, task analysis, and learner analysis are most effective, whether the setting is face-to-face or at a distance In addition, following the development and implementation of the learning materials with careful evaluation and revision adds value and power to the instruction.

References

Alessi, S. M., & Trollip, S. R. (2001). *Multimedia for learning: Methods and development*. Needham Heights, MA: Allyn & Bacon.

Ally, M. (2008). Foundations of educational theory for online learning. In T. Anderson (Ed.), *The theory and practice of online learning* (pp. 15-44). Edmonton, AB: AU Press.

Andrews, D. H., & Goodson, L. A. (1980). A comparative analysis of models of instructional design. *Journal of Instructional Development, 3*(4), 2-16. http://www.jstor.org/stable/30220623.

Branch, R. M. (2009). *Instructional Design: The ADDIE approach*. New York, NY: Springer.

Branch, R. M., & Kopcha, T. J. (2014). Instructional design models. In J. M. Spector et al. (Eds.). *Handbook of research on educational communications and technology* (4th ed.). (pp. 77-87). New York, NY: Springer.

Dick, W., Carey, l., & Carey, J. (2005). *The systematic design of instruction* (6th ed.). Boston, MA: Allyn & Bacon.

Gagne, R. M., Wager, W. W., Golas, K. & Keller, J. M. (2005). *Principles of instructional design* (5th ed.). Belmont, CA: Wadsworth.

Keller, J. M. (2010). *Motivational Design for Learning and Performance: The ARCS Model Approach*. New York, NY: Springer.

Keller, J., & Suzuki, K. (2004). Learner motivation and E-learning design: A multinationally validated process. *Journal of Educational Media, 29*(3), 229-239. http://dx.doi.org/10.1080/1358165042000283084

Morrison, G. R., Ross, S. M., Kalman, H. K., & Kemp, J. E. (2013). *Designing effective instruction* (7th ed.). Hoboken, NJ: Wiley.

Posner, G. J., & Strike, K. A. (1976). A categorization scheme for principles of sequencing content. *Review of Educational Research, 46* (4), 665-690.

Reigeluth, C. M. (1987). Lesson blueprints based on the elaboration theory of instruction. In C. M. Reigeluth (Ed.), *Instructional theories in action: Lessons illustrating selected theories and models* (pp. 245-288). Hillsdale, NJ: Lawrence Erlbaum Associates.

Reigeluth, C. M. (1999). The elaboration theory: Guidance for scope and sequence decisions. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 2, pp. 425-453). Mahwah, NJ: Lawrence Erlbaum Associates.

Smith, P. L., & Ragan, T. J. (2004). *Instructional design* (3rd ed.). Hoboken, NJ: Wiley.
Sullivan, H., & Higgins, N. (1983). *Teaching for Competence*. New York, NY: Teachers College Press.

Activities

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Learning is achieved through activities both passive (reading, listening, viewing) and active (experimenting, rehearsing, trying). Activities should be chosen that best suit the content, students' levels of knowledge, experience, and ability, and online delivery constraints, particularly accommodating synchronous, asynchronous, and mixed course participation. Student self-selected or self-developed learning activities should be incorporated along with instructor-selected and instructor-developed activities, consistent with a two-dimensional purpose.

Background

Instruction is different from information. Libraries are full of information, and instruction uses information. However, instruction carefully structures the information in a manner to make it comprehensible to the learner, engages the learner with the content, and includes instructional strategies that help the learner make the information meaningful and relate it to other knowledge. Both classroom instruction and learning in an online setting make use of a wide array of activities and strategies.

Early research by Craik and Lockhart (1972) found that individuals who process information at a deeper level

recalled more information than those processing information at a superficial level. Instructional strategies are designed to create a deeper level of processing that leads to increased learning and longer-term retention. This section focuses on the use of instructional strategies or activities instructional designers employ.

Defining Instructional Strategies

The field of instructional design has a long history of using empirically-based instructional strategies. One of the earliest descriptions was Susan Markle's 1969 book, which was used in the design of programmed instruction. Some of the strategies discussed in the book are still in use today. Instructional strategies can range from process, such as rehearsal and practice, to mnemonics, to teaching more complex skills, such as interpersonal communication (Bandura 1977). Each of these strategies is based on empirical research that supports its effectiveness and provides guidelines for its use. For example, one would not use Bandura's social learning theory to teach a concept or EG-Rule (discovery method) to teach a fact. That is, specific types of content (e.g., facts, concepts, principles, or problem solving) require different strategies. Based on a quick review of some early examples of programmed instruction, one might conclude that rehearsal and practice was the one-size-fits-all strategy. However, instructional intervention research over the last 70 years has identified a wide array of instructional strategies for designing effective instruction (Hsieh et al., 2005).

Conceptualizing Instructional Strategies

Rigney (1978) identified two distinct classes of instructional strategies. First is the *embedded* instructional strategy that becomes part of the content. Embedded

strategies require the learner to manipulate data to develop understanding. For example, when teaching gas laws, the learner might use a computer simulation to collect data and then plot the data to discover, for example, a relationship between temperature and pressure. More generic, and applicable with a variety of content, are *detached* strategies. For example, a generative strategy, such as "Describe what you just read in your own words," is easily used with a range of content and so would be described as a *detached* instructional strategy. Wittrock (2010) and others (Grabowski, 2004; Jonassen, 1988; Mayer, 2010) view learning as a generative process. Learning is the process of attending to stimuli and then giving meaning to the stimuli using one's prior knowledge and experiences. That is, the learner relates the new information to old information to create meaningful information that is resistant to forgetting. Wittwer and Renkl (2010) state that an instructional explanation or strategy has two essential parts: a goal-oriented instructional explanation that may include elaborations, and a deeper engagement with the content, initiated by an instructional strategy.

Empirical Support for Instructional Strategies

Instructional design, educational psychology, and psychology have a rich history of conducting empirical research that compares one or more instructional strategies for teaching the same content to determine effectiveness. Levin and O'Donnell (1999) label this type of research as educational intervention research in which the researcher creates an intervention, applies the intervention, and observes changes in human behavior. They trace some of the earliest intervention research to Thorndike (1910). Early examples of intervention research in our field include a study by Whelden (1954) comparing the use of guided

practice and a study by Peterson and Schramm (1954) comparing the effectiveness of eight different types of graphs to teach percentages.

The following is a brief summary of intervention research on the more common types of content for which an instructional designer may design a strategy. Facts are one of the simplest forms of content to teach. Strategies for teaching facts include mnemonics (Rummel, Levin & Woodward, 2003) and elaborative interrogation (Woloshyn, Paivio & Pressley, 1994). Concepts are categories we use to simplify the facts of the world. Markle (1969, 1975) proposed an elaborate strategy based on examples and non-examples for teaching categories. Tennyson and Cocchiarella (1986) proposed a simpler approach using a definition, one best example, and then practice using examples and non-examples. Another category of knowledge is the principles or rules that explain a relationship between concepts. Markle (1969) proposed that a rule be stated and then followed by the presentation of one or more examples, or alternatively, that a series of examples be presented and the learner prompted to discover the rule. Variations include having the learner develop an argument explaining why something happens (Jonassen & Hung, 2006) or why the rule works (Wiley & Voss, 1999). Procedures can be described as either cognitive (e.g., solving a math problem) or psychomotor (e.g., drilling a hole). One example strategy for teaching cognitive procedures is worked examples (Atkinson & Renkl, 2007; Sweller & Cooper, 1985; Van Gog, Paas & Van Merriënboer, 2006). Psychomotor skills can be taught by modeling the behavior and then having the learner develop a mental model before practicing the skill (Bandura, 1977; Bandura & Jeffery, 1973).

Summary

Selection of instructional strategies to teach content should be based on intervention research, as described by Levin and O'Donnell (1999). When designers make use of verified instructional strategies, the design is more likely to produce consistent results for all learners.

References

Atkinson, R. K., & Renkl, A. (2007). Interactive example-based learning environments: Using interactive elements to encourage effective processing of worked examples. *Educational Psychological Review, 19* (3), 375-386. doi: DOI 10.1007/s10648-007-9055-2

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A., & Jeffery, R. W. (1973). Role of symbolic coding and rehearsal prcesses in observational learning. *Journal of Personality and Social Psychology, 26*(1), 122-130.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*, 671-684.

Grabowski, B. J. (2004). Generative learning contributions to the design of instruction and learning. In D. J. Jonassen (Ed.), *Handbook of educational communications and technology* (2nd ed., pp. 719-743). Hillsdale, NJ: Lawrence Erlbaum Associates.

Hsieh, P.et al. (2005). Is educational intervention research on the decline? *Journal of Educational Psychology, 97*(4), 523-529.

Jonassen, D. H., & Hung, W. (2006). Learning to troubleshoot: A new theory-based design

architecture. *Educational Psychology Review, 18*(1), 77-114.

Jonassen, D. J. (1988). Integrating learning strategies into courseware to facilitate deeper process. In D. J. Jonassen (Ed.), *Instructional designs for microcomputer courseware* (pp. 151-181). Hillsdale, NJ: Lawrence Erlbaum Associates.

Levin, J. R., & O'Donnell, A. M. (1999). What to do about educational research's credibility gap? *Issues in Education: Contributions from Educational Psychology*, *5*(2), 177-229.

Markle, S. (1969). *Good frames and bad: A grammar of frame writing*. New York: Wiley.

Markle, S. (1975). They teach concepts, don't they? *American Educational Research Journal, 4*(6), 3-9.

Mayer, R. E. (2010). Merlin C. Wittrock's Enduring Contributions to the Science of Learning. *Educational Psychologist, 45*(1), 46-50. doi: 10.1080/00461520903433547

Peterson, L. V., & Schramm, W. (1954). How accurately are different kinds of graphs read? *Audiovisual communication review, 2*(3), 178-189. doi: 10.1007/bf02713334

Rigney, J. W. (1978). *Learning strategies: A theoretical perspective.* In H. Rummel, N., J. R. Levin, and M. M. Woodward (2003). Do pictorial mnemonic text-learning aids give students something worth writing about? *Journal of Educational Psychology, 95*(2), 327-334.

Sweller, J., & Cooper, G. (1985). The use of worked examples as a substitute for problem solving in algebra. *Cognition and Instruction, 2*(1), 59-89.

Tennyson, R. D., & Cocchiarella, M. J. (1986). An empirically based instructional design theory foF. &*r teaching concepts. *Review of Educational Research, 56*(1), 40-71.

Thorndike, E. L. (1910). The contribution of psychology to education. *Journal of Educational Research, 1*(1), 5-12.

van Gog, T., Paas, F., & van Merriënboer, & J. J. G. (2006). Effects of process-oriented worked examples on troubleshooting transfer performance. *Learning and Instruction, 16*(2), 154-164.

Whelden, C. H. (1954). Using a film to teach a home nursing procedure. *Audiovisual communication review, 2*(4), 277-281. doi: 10.1007/bf02713294

Wiley, J., & Voss, J. F. (1999). Consturcting argument for multiple sources: Tasks that promote understandiung and not just memory for text. *Journal of Educational Research, 91*(2), 301-311.

Wittrock, M. C. (2010). Learning as a generative process. *Educational Psychologist, 45*(1), 40-45. doi:10.1080/00461520903433554

Wittwer, J., & Renkl, A. (2010). How effective are instructional explanations in example-based learning? A meta-analytic review. *Educational Psychology Review, 22*(4), 393-409.

Woloshyn, V. E., Paivio, A., & Pressley, M. (1994). Use of elaborative interrogation to help students acquire information consistent with prior knowledge and information inconsistent with prior knowledge. *Journal of Educational Psychology, 86*(1), 79-90.

Resources

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A range of resources should be articulated to foster deep learning and extend course-centered experiences and activities. Resources should be multimodal to accommodate students' interests, understandings, and capacities, consistent with course content and technological accessibility. Resources should allow students to go beyond the constraints of the formal course structure to engage in self-directed, extended learning.

Background

The terms instructional resources and instructional materials are often used interchangeably in the literature (Koszalka, Russ-Eft & Reiser, 2013; Polly, 2011). For the purpose of this chapter, instructional resources will be defined as encompassing the broad range of materials, media, and services available to deliver, enhance, and facilitate instruction and learning online. Resources for online courses include textbooks and other reading materials and common components found within learning management systems, such as course announcements, discussion forums, pages, documents, presentations, tutorials, assessments, feedback mechanisms and grade books (Piña, 2017). Resources also include items delivered

outside the learning management system, such as links to websites, search engines, library databases, and mobile apps. The information contained in these resources consists of individual or combined instances of text, audio, still images, and video/motion images (Meyer, 2014).

Morrison and Anglin (2011) have emphasized the critical nature of resources to online course design: "When there is a separation of the learner and instructor in both time and location, the traditional sources of instructional support disappear, and there is a great need for reliance on well-designed instructional materials" (p. 243).

Multimodality

Head, Lockee, and Oliver (2002) propose that the quality of online courses is dependent upon the teaching methods used and upon the attributes of the instructional resources, including the ability "to deliver information via specific sensory modalities, such as auditory or visual channels of communication" (p. 263). Dual coding – the idea that humans process visual and auditory information using separate cognitive channels (Paivio, 1986, 1991) – together with the recognition that the brain can process a limited amount of information in each of these channels (Miller, 1956; Moore, Burton & Myers, 2004), suggests that the design of online courses should include resources that are multimodal in nature. Richard Meyer has posited several research-based principles to maximize learners' abilities to process and code information (Meyer, 2005; Meyer 2014):

- *Coherence Principle*. People learn better when extraneous words, graphics, and audio that are not directly relevant are excluded rather than included.

- *Modality Principle*. People learn better from animation and audio narration than from animation and on-screen text.
- *Multimedia Principle*. Retention is improved through words and corresponding still or motion graphics/video than from words alone.
- *Spatial Contiguity Principle*. People learn better when corresponding words and graphics are presented near, rather than far, from each other on the screen.
- *Temporal Contiguity Principle*. People learn better when corresponding words and graphics are presented at the same time.
- *Redundancy Principle*. People learn better when visual information is accompanied by audio narration alone—not with audio narration plus onscreen text.

Self-Directed Extended Learning

Mobile devices, such as smartphones and tablets, allow learners to access, manipulate, create, and share information outside the confines of the physical classroom or learning management system (Shepard, 2011). Morrison and Anglin (2011) have noted that research supporting self-directed learning has identified a number of strategies that contribute to positive learning effects and that online course design should incorporate resources that promote self-directed, personalized learning. Jung and Latchem (2011) advocate for the use of wikis, online website creation tools, Google apps, and various websites to create extended learning spaces. These allow learners to acquire knowledge, apply knowledge, and construct new and original knowledge (McTighe & March, 2015). The design of online courses need not begin and end within the confines of the learning management system (Piña, 2017).

Empirical Support for Instructional Resources

Clark and Meyer (2011) have stated, "Based on cognitive theory and research evidence, we recommend that e-learning courses include words and graphics rather than words alone. … By graphics we mean static illustrations such as drawings, graphs, charts, maps, or photos, and dynamic graphics such as animation or video" (p. 70). In a two-part study involving 93 undergraduate students, Brunye, Taylor, and Rapp (2008) found that procedural learning was enhanced when instructional materials were presented in a multimedia format versus text alone, even when the multimedia was as minimal as a single simple image.

Richard Meyer and his associates have established each of their multimedia learning principles governing the use of instructional resources on empirical evidence (Clark and Meyer, 2011; Meyer, 2005). Summarizing eleven studies in which the use of onscreen text and graphics together was compared to onscreen text alone, Clark and Meyer (2011) observed:

> [P]eople who learned from words and graphics produced between 55 percent to 121 percent more correct solutions to transfer problems than people who learned from words alone. Across all studies, a median percentage gain of 89 percent was achieved with a median effect size of 1.50. pp. 80-81.

The contiguity principle was affirmed by eight studies in which students receiving integrated presentations generated 60% more correct solutions than those who

received separated presentations. The overall effect size was 1.60.

Meyer reviewed 21 experimental comparisons that confirmed the modality principle by comparing graphics and text with graphics and audio narration. Learners performed better in the latter treatment, with a median effect size of .97. Seven different studies looking at the effects of redundant onscreen text found support for the redundancy principle with effect sizes ranging from .65 to 1.0.

Finally, Clark and Meyer (2011) state that, "the coherence principle is important because it is commonly violated, is straightforward to apply, and can have a strong impact on learning" (p. 151). To test the principle, two versions of a narrated presentation – one with background music and sound effects relevant to the presentation topic were delivered to students. Those who received the narration presentation without the added audio performed an average of 104% better, with a median effect size of 1.66. The message: keep lessons uncluttered.

To determine the effectiveness of self-directed learning (SDL) in improving learning outcomes in health professionals, Murad et al. analyzed 59 studies involving 8,011 learners. Results indicated a moderate median effect size of .45 indicating acquisition of knowledge was grater in SDL environments than using traditional teaching methods (Murad et al., 2010).

In a survey of 1,429 self-directed learners who subscribed to MIT's OpenCourseWare e-newsletter, Curtis Bonk and his associates found that SDL was occurring at home, work, and school, but also in libraries, cafes, airports, cars, subways, and trains. Thirty-five percent of

respondents stated that they engaged in self-directed learning "anywhere with a mobile device" (Bonk et. al, p. 353). Respondents used a number of online resources, including Wikipedia, MIT OpenCourseWare, YouTube, TED, Khan Academy, How Stuff Works, and MOOC sites Coursera, Udacity, and EdX. Eighty-eight percent of respondents indicated that they had gained new knowledge as a result of their SDL activities, and 72% rated the freedom to learn as the most significant factor to their success (Bonk, Lee, Kou, Xu & Sheu, 2015).

Summary

This chapter has provided a mere sample of the evidence of the benefits of instructional resources that are multimodal and that extend learning beyond the formal course structure. The wise and judicious use of resources in the instructional design of online courses is a key component of online course quality. If fact, it would not be a stretch to say that, without instructional resources, there would not be any online education.

References

Bonk, C. J., Lee, M., Kou, X., Xu, S., & Sheu, F. (2015). Understanding the self-directed online learning preferences, goals, achievements, and challenges of MIT OpenCourseWare subscribers. *Journal of Educational Technology & Society 18*(2), 349-368.

Brunye, T. T., Taylor, H. A., & Rapp, D. N. (2008). Repetition and dual coding in procedural multimedia presentations. *Applied Cognitive Psychology*, *22*(7), 877-895.

Clark, R. C., & Mayer, R. E. (2011). *E-Learning and the science of instruction: Proven guidelines for*

consumers and designers of multimedia learning (3rd Ed). San Francisco, CA: Pfeiffer.

Head, J. T., Lockee, B. B., & Oliver, K. M. (2002). Method, media and mode: clarifying the discussion of distance education effectiveness. *Quarterly Review of Distance Education 3*(3), 261-269.

Jung, I., & Latchem, C. (2011). A model for e-education: Extended teaching spaces and extended learning spaces. *British Journal of Educational Technology 42*(1), 6–18.

Koszalka, T. A., Russ-Eft, D. F., & Reiser, R. A. (2013). *Instructional designer competencies: The standards* (4th Ed.). Charlotte, N.C.: Information Age Publishing.

McTighe, J., & March, T. (2015). Choosing apps by design. *Educational Leadership 72*(8), 36-41.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*(2), 81-97.

Meyer, R. E. (2005). Multimedia strategies. In H. F. O'Neill (Ed.), *What works in distance learning: Guidelines* (7-24). Charlotte, NC: Information Age Publishing.

Meyer, R. E. (2014). *The Cambridge handbook of multimedia learning*. New York, NY: Cambridge University Press.

Moore, D. M., Burton, J. K., & Myers, R. J. (2004). Multiple-channel communication: The theoretical and research foundations of multimedia. In D. H. Jonassen (Ed.) *Handbook of research on educational communications and technology* (851-875). Mahwah, NJ: Lawrence Erlbaum Associates.

Morrison, G. R., & Anglin, G. J. (2011). An analysis of success and failures: Focusing on learner-content interactions for the next generation of distance

education. In L. Moller and J. B. Huett (Eds.), *The next generation of distance education: Unconstrained learning* (235-250). New York, NY: Springer.

Murad, M. H., Coto-Yglesias, F., Varkey, P., Prokop, L. J, & Murad, A. L. (2010). The effectiveness of self-directed learning in health professions education: A systematic review. *Medical Education 44*(11), 1057-1068.

Paivio, A. (1986). *Mental representations: A dual coding approach*. New York: Oxford University Press.

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology 45,* 255-287.

Piña, A. A. (2017). An educational leader's view of learning management systems. In A. A. Piña, V. L. Lowell, and B. R. Harris (Eds.). *Leading and managing e-learning: What the e-learning leader needs to know*. New York, NY: Springer

Polly, D. (2011). Teachers' learning while constructing technology-based instructional resources. *British Journal of Educational Technology 42*(6), 950-961.

Shepard, M. (2011). Creating a culture of digital collaboration in online learning. In L. Moller and J. B. Huett (Eds.) *The next generation of distance education: Unconstrained learning* (127-138). New York, NY: Springer.

Application

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Consistent with providing for active learning, students should have integral opportunities within the course design to apply new learning. Effective course design incorporates opportunities to practice newly acquired understandings and skills, both independently and collaboratively. Online collaborative application opportunities should be developed using social media, and offline collegial groups also should be structured whenever physical proximity of students affords this opportunity.

Background

It is generally acknowledged that students learn best when they are actively engaged in the learning process (Chickering & Gamson, 1987; Dewey, 1938). Wirkala and Kuhn (2011) state their conclusion: "Students show better long-term retention and ability to apply new material if the instructional method is one that actively engages them and enables them to put new ideas to use" (p. 1180). Although there are many ways in which to engage students in the learning process, one of the most common is asking students to *apply* what they have learned to solve new

problems (Bransford, Brown & Cocking, 2000; Kolodner, 1992). In general, application activities should engage learners in problem situations that practicing professionals encounter (Stepich, Ertmer & Lane, 2001).

For many years, professional educators have recognized the problem of inert knowledge (Whitehead, 1929), which refers to the domain knowledge acquired by students during their studies but which remains inaccessible when needed to solve authentic problems. Although graduates might perform reasonably well in familiar situations, their performances quickly deteriorate as situations become more complex. Efforts to address this problem have focused on strategies designed to develop the kind of active knowledge students need to "think like a professional" in order to solve authentic problems (Quinn, 1994; Rowland, Para & Basnet, 1995).

Currently, a variety of learning and instructional models incorporate learner engagement as a way to increase knowledge, develop critical thinking skills, support transfer of knowledge, and increase motivation. Instructional approaches, such as problem-based learning (Barrows, 1986), project-based learning (Krajcik & Blumenfeld, 2006), case-based learning (Ertmer, Quinn & Glazewski, 2014), and authentic apprenticeship learning (Toohey, Ryan & Hughes, 1996) are some of the more commonly used approaches that require learners to apply previously acquired conceptual and domain knowledge. For the sake of brevity, we include all of these approaches under the umbrella term of *experiential learning* (Hawkins & Weiss, 2004).

Experiential Learning

Experiential learning dates back to Dewey (1938), who explained that people learn through a series of primary and secondary experiences. The primary experience comprises the activity in which learners directly engage, while the secondary experience encompasses the reflection and/or feedback that enables learners to process the initial experience. Contemporary researchers suggest that experiential learning is a method of "learning by doing" and is "fundamental to meaningful learning" (Lewis & Williams, 1994, p. 5). In formal education, experiential learning links "academic knowledge and practical skills" (Ruhaneu, 2005, p. 34). This approach is especially important when considering adult learners who have accumulated years of prior learning and work experiences. Given that adults often enroll in graduate programs to make themselves more employable, they are especially eager to engage in experiences that develop real-world skills that employers seek. Experiential learning "stresses practical application of knowledge to real world situations" (Hawkins & Weiss, 2004, p. 3).

Experiential learning supports a participative, learner-centered approach, which emphasizes "direct engagement, rich learning events and the construction of meaning by learners" (Andersen, Boud & Cohen, 2000, p. 225). Benefits include a greater potential for meaningful learning (Lewis & Williams, 1994), recognition of what learners bring to the experience (Andersen et al., 2000), increased self-efficacy and learner motivation (Driscoll, 2005), and the development of self-directed learners (Linn, Howard & Miller, 2004) who engage as full partners in the learning process and assume primary responsibility for their learning (O'Banion, 1997).

Application in Online Learning

It is imperative that online students have opportunities to apply what they are learning, as adult learners tend to prefer learning opportunities that reflect the nature of their professional roles (Cercone, 2008). This requires learner engagement in both individual and collaborative experiences (MacNeill, Telner, Sparaggis-Agaliotis & Hanna, 2014). Developing effective experiential learning, especially in the online environment, entails planning for, and providing, relevant opportunities for learners to explore how their learning experiences can be applied to real-world situations. As such, instructors need to "be aware of the effect of the environment and to utilize all aspects of it to create as worthwhile an experience as possible" (Lindsey & Berger, 2009, p. 122). Experiential learning effectiveness requires a "dynamic match" between the learner and the task (Sims, 1983). Instructors facilitate this match by carefully considering the learning goal, the context of the experience, the needs of their learners, and the learners' prior course experiences. With this level of preparation and instructor engagement, the effectiveness of application experiences can be maximized.

A common element of many higher education programs is a practicum experience--an on-site, supervised experience that utilizes knowledge and skills gained from the program of study. Such experiences are sometimes referred to as a placement, internship, externship or apprenticeship program. According to Toohey, Ryan and Hughes (1996), the purpose of a practicum is to give students insight into the real world, help integrate them into the workplace, support the development of professional and interpersonal skills, link theory to practice, and even enhance employment possibilities. Katula and Threnhauser

(1999) have noted that this form of experiential learning had been standard practice in many programs for decades. For example, a year-long practicum is required for clinical psychologists attending accredited institutions (Hatcher & Lassiter, 2007), a minimum of one practicum (student teaching) experience is required of U.S. teachers, the majority of business schools require a formal internship, and the medical field requires formal residency programs for the purpose of providing a guided application of skills (Toohey et al., 1996).

For online programs, a practicum opportunity can also be incorporated but may require an extra level of organization (Donovan, Porter & Stellar, 2010). For example, the relationship between the student, the practicum supervisor, and the course facilitator needs to be clearly established with a clear communication pattern. Participants will also benefit from having a highly organized set of documents to guide the process: a written proposal complete with goals and benchmarks, a Gantt Chart to standardize the timeline, regular reflections, and a final project to showcase not only the work completed, but also the lessons learned (Higgins, 2009).

Application, in and of itself, is not enough to build professional knowledge and expertise. Students also must be able to reflect on and articulate what those experiences mean and to index those experiences in ways that promote ready access and retrieval (Kolodner, 1992; Schön, 1983). According to Shulman (1996), “We do not learn from experience; we learn by thinking about our experience” (p. 208).

Empirical Support for Application

Paul and Mukhopadhyay (2005) incorporated experiential learning, guided by Chickering and Gamson's (1987) learner-centered principles, into an international business education program as a means to improve students' problem-solving skills. Five types of class activities were included: cases, projects (e.g., mock business negotiations), in-class exercises (e.g., demonstrations), guest speakers (e.g., interactive sessions with business executives who shared real-life experiences), and video cases. Data were collected from two classes (n = 81), and students were asked to compare the experiential classes to other courses they had taken within the program. Students reported that the case write-up, case discussion questions, role-playing in-class exercises, and use of guest speakers helped them reach a higher level of understanding and made learning more fun, effective, efficient, and easier. The researchers also reported that learners "perceived that their skills, such as analytical, problem-solving, creative and critical thinking, improved" (p. 18).

Strobel and van Barneveld (2009) conducted a meta-synthesis of meta-analyses of problem-based learning (PBL) research, using quantitative findings and the narrative descriptions from eight meta-analyses. More specifically, their focus was on findings that assessed effectiveness of PBL versus traditional approaches. Results indicated that PBL instruction was more effective for long-term retention and resulted in high student and teacher satisfaction, while traditional approaches were favored for short-term retention, such as that associated with standardized board exams. Performance- or skill-based assessments, including observations by supervisors as well as students' case analyses, also favored a PBL approach. Finally, assessments that covered both knowledge and skill

(including oral examinations) favored PBL approaches. The authors concluded, “PBL is significantly more effective than traditional instruction to train competent and skilled practitioners and to promote long-term retention of knowledge and skills acquired during the learning experience or training session” (p. 55).

Newmann, Bryk, and Nagaoka (2001) examined the impact of assignments that required “authentic intellectual work” on K-12 students’ academic achievement (n = 1,800 3rd-graders; 1,700 6th-graders; 1,400 8th-graders) in the Chicago Public Schools. Authentic intellectual work involves “original application of knowledge and skills, rather than just routine use of facts and procedures. It also entails disciplined inquiry into details of a particular problem and results in a product or presentation that has meaning or value beyond school” (p. 14). The researchers contrasted 1) didactic assignments, which required students to learn facts, definitions, and algorithms and typically to restate them in the same form they were learned with 2) interactive assignments, which required students to formulate problems, to organize knowledge and experiences in new ways, and to express themselves using elaborated statements both orally and in writing. Outcome measures included the math and reading subtests on the Iowa Test of Basic Skills (ITBS) and the reading, math, and writing subtests of the Illinois Goals and Assessment Program (IGAP). Results demonstrated a consistent positive relationship between student exposure to interactive assignments, as described above, and students’ learning gains on the ITBS regardless of socioeconomic status, gender, and prior achievement, with effect sizes of .43, .64, and .52 on the IGAP reading, math, and writing tests.

Service-learning opportunities represent another avenue for applying skills learned in academic courses. Maddrell (2015) defined service learning as "an educational approach that combines community service, academic coursework, and work-based experience" and "has been shown to positively affect academic achievement, as well as personal and social outcomes" (p. 216). For example, Yorio and Ye (2012) conducted a meta-analysis (n = 40) of service-learning studies with a focus on social, personal, and cognitive learning outcomes in a college or university setting. Their study found that service learning positively impacts students' cognitive development, understanding of social issues, and personal insights. Similarly, Novak, Markey, and Allen (2007) conducted a meta-analysis (n = 9) of studies comparing service-learning course options with non-service-learning course options for undergraduates. Results showed that service learning improved academic understanding, skills learned, and the ability to apply knowledge and to reframe complex social issues.

Tiwari, Lai, So & Yuen (2006) compared the effects of problem based learning to those of lecturing on development of students' critical thinking skills. The undergraduate nursing students (n = 79) were randomly assigned to either a PBL or lecture-based version of the same course. Critical thinking was measured by the California Critical Thinking Disposition Inventory (CCTDI), and data were collected four times over three years. Initially, a significant difference was not found between the two groups; however, over time, the students from the PBL version of the course showed significantly greater improvements in critical thinking skills. Students enrolled in the PBL-based course showed significant differences in the development of critical thinking

dispositions, outperforming those enrolled in the lecture-based course.

Summary

The evidence provided in this chapter indicate that there are many ways to incorporate effective application activities within online courses. As online courses are planned and developed, instructional designers should consider the most relevant application experiences and the most appropriate ways to include them in online courses.

References

Andersen, L., Boud, D. & Cohen, R. (2000). Experience-based learning. In G. Foley, *Understanding adult education and training*, (2nd ed.). Sydney, Australia: Allen & Unwin.

Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical Education, 20*, 481–486. http://dx.doi.org/10.1111/j.1365-2923.1986.tb01386.x

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.) (2000). *How people learn: Brain, mind, experience, and school.* Washington, DC: National Academy Press.

Chickering, A. W., & Gamson, Z. F. (1987, March). *Seven principles for good practice in undergraduate education*. American Association for Higher Education Bulletin.

Cercone, K. (2008). Characteristics of adult learners with implications for online learning design. *AACE Journal, 16*(2), 137-159.

Dewey, J. (1938). *Experience and education*. New York, NY: Collier.

Donovan, T., Porter, R. & Stellar, J. (2010). Experiencing success: Some strategies for planning the program. *New Directions for Teaching and Learning,* 124, 89-94.

Driscoll, M. P. (2005). *Psychology of learning for instruction* (3rd ed.). Boston, MA: Allyn & Bacon.

Ertmer, P. A., Quinn, J. A., & Glazewski, K. D. (2014). *The ID CaseBook: Case studies in instructional design* (4th ed.). Upper Saddle River, NJ: Pearson.

Hatcher, R., & Lassiter K. (2007). Initial training in professional psychology: The practicum competencies outline. *Training and Education in Professional Psychology, 1*(1), 49-63.

Hawkins, D. E., & Weiss, B. L. (2004). Experiential education in graduate tourism studies: An international consulting practicum. *Journal of Teaching in Travel and Tourism*, *4*(3), 1-29.

Higgins, P. (2009). Into the big wide world: Sustainable experiential education for the 21st century. *Journal of Experiential Education, 32*(1), 44-60.

Katula, R. A., & Threnhauser, E. (1999). Experiential education in the undergraduate curriculum, *Communication Education, 48*(3), 238-255.

Kolodner, J. L. (1992). An introduction to case-based reasoning. *Artificial Intelligence Review, 6*(1), 3-34.

Krajcik, J. S., & Blumenfeld, P. C. (2006). Project-based learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 317-333). New York, NY: Cambridge University Press.

Lewis, L. H., & Williams, C. J. (1994). Experiential learning: Past and present. In J. Lewis and R. A. Caffarella (Eds.), *Experiential learning: A new approach* (pp. 5-16). San Francisco: Jossey-Bass.

Lindsey, L., & Berger, N. (2009). Experiential approach to instruction. In C. M. Reigeluth and A. A. Carr-Chellman (Eds.), *Instructional-design theories and*

models: Building a common knowledge base (Volume III, pp. 117-142). New York, NY: Taylor and Francis.

Linn, P. L., Howard, A. & Miller, E. (Eds.) (2004*). The handbook for research in cooperative education and internships.* Mahwah, NJ: Erlbaum.

MacNeill, H., Telner, D., Sparaggis-Agaliotis, A., & Hanna, E. (2014). All for one and one for all: Understanding health professionals' experience in individual versus collaborative online learning. *Journal of Continuing Education in the Health Professions*, *34*(2), 102–111. DOI: 10.1002/chp.21226

Maddrell, J. A. (2015). Designing authentic educational experiences through virtual service learning. In B. Hokanson, G. Clinton, and M. W. Tracey (Eds.), *The Design of learning experiences* (pp. 215–229). New York, NY: Springer.

Newmann, F. M., Bryk, A. S., & Nagaoka, J. K. (2001). *Authentic intellectual work and standardized tests: Conflict or coexistence?* Chicago, IL: Consortium on Chicago School Research.

Novak, J. M., Markey, V. & Allen, M. (2007). Evaluating cognitive outcomes of service learning in higher education: A meta-analysis. *Communication Research Reports, 24*(2), 149–157. DOI: 10.1080/08824090701304881

O'Banion, T. (1997). *A learning college for the 21st century*. Washington, DC: American Association of Community Colleges.

Paul, P., & Mukhopadhyay, K. (2005) Experiential learning in international business education. *Journal of Teaching in International Business, 16*(2), 7-25. DOI:10.1300/J066v16n02_02

Quinn, J. (1994). Connecting education and practice in an instructional design graduate program. *Educational*

Technology Research and Development, 42(3), 71–82.

Rowland, G., Parra, M. L. & Basnet, K. (1995). Educating instructional designers: Different methods for different outcomes. In B. B. Seels (Ed.), *Instructional design fundamentals: A reconsideration* (pp. 223–236). Englewood Cliffs, NJ: Educational Technology Publications.

Ruhaneu, L. (2005). Bridging the divide between theory and practice. Experiential learning approaches for tourism and hospitality management education. *Journal of Teaching in Travel and Tourism*, *5*(4), 33-51.

Stepich, D. A., Ertmer, P.A., & Lane, M. M. (2001). Problem-solving in a case-based course: Strategies for facilitating coached expertise. *Educational Technology Research and Development, 49*(3), 53-69.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action.* New York, NY: Basic Books.

Shulman, L. S. (1996). Just in case: Reflections on learning from experience. In J. A. Colbert, P. Desberg, and K. Trimble (Eds.), *The case for education: Contemporary approaches for using case methods* (pp. 197–217). Boston: Allyn & Bacon.

Sims, R. (1983). Kolb's experiential learning theory: A framework for assessing person-job interaction. *The Academy of Management Review, 8*(3), 501-508.

Strobel, J., & van Barneveld, A. (2009). When is PBL more effective? A meta-synthesis of meta-analyses comparing PBL to conventional classrooms. *Interdisciplinary Journal of Problem-Based Learning, 3*(1). dx.doi.org/10.7771/1541-5015.1046

Tiwari, A., Lai, P., So, M., & Yuen, K. (2006). A comparison of the effects of problem-based learning

and lecturing on the development of students' critical thinking. *Medical Education*, *40*(6), 547-554. dx.doi.org/10.1111/j.1365-2929.2006.02481.x

Toohey, S., Ryan, G., & Hughes, C. (1996). Assessing the practicum. *Assessment and Evaluation in Higher Education, 21*, 215-229.

Whitehead, A. N. (1929). *The aims of education and other essays*. New York, NY: Macmillan.

Wirkala, C., & Kuhn, D. (2011). Problem-based learning in K-12 education: Is it effective and how does it achieve its effects? *American Educational Research Journal, 48*(5), 1157–1186.

Yorio, P. L., & Ye, F. (2012). A meta-analysis on the effects of service-learning on the social, personal, and cognitive outcomes of learning. *Academy of Management Learning & Education, 11*(1), 9–27.

Assessment

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Regardless of the model of sequencing learning opportunities, the sequence should include points of assessment for purposes of feedback and review, with instances of re-teaching as necessary for students to acquire full understanding. Formative assessment, whether formal, informal, or incidental, allows teachers and students to give feedback to one another and to review the operationalized design in order to revise the course design based on students' input with regard to knowledge acquisition and effective use of new understandings and skills.

Background

Assessment is often used interchangeably in the literature--and particularly by practitioners--with processes such as testing, measurement, and evaluation. In reality, all have similar functions, and separating them often boils down to finer-grained uses and sequencing in lessons. For instructional designers, assessment uses various types of measurement, and sometimes formal testing, to collect data regarding learner activities, progress, and attainment of objectives in a course or lesson. Sequenced, intermittent assessment is encouraged so that instructors can address

learner needs for re-teaching and review or for adapting content to be easier or more advanced. At the same time, the instructional designer obtains feedback about what aspects of the lesson are working well and what needs to be changed. When instruction moves to an asynchronous online setting, opportunities for feedback are, if anything, even more crucial because the number of channels by which students and instructors can communicate is reduced.

Formative Assessment

Formative assessment takes place while instruction is still going on. In contrast, summative assessment is used by evaluators as a basis for judging the effectiveness of completed instruction. Arguably, if one conceives of instruction as always subject to revision and improvement, then all assessment can be seen as formative to some degree (Morrison, Ross, Kalman & Kemp, 2013). According to Sadler (1989), for everyone involved in instruction:

> "Feedback is a key element in formative assessment, and is usually defined in terms of information about how successfully something has been or is being done. Few physical, intellectual or social skills can be acquired satisfactorily simply through being told about them. Most require practice in a supportive environment which incorporates feedback loops." (p.120)

For teachers, feedback guides decisions about how effective both the content and delivery of instruction has been for addressing student needs. Accordingly, decisions can be made regarding the pace and difficulty of the instruction and the possible provision of extra practice or

remediation. For students, feedback provides information about the strength, weaknesses, and success of their performance, and, in turn, guidance for subsequent learning activities (e.g., rereading, seeking help, progressing to the next unit). For designers, feedback can reveal lesson completion times for different types of learners, reactions by teachers and students to varied design components, the degree to which individual learning objectives are being achieved, and which parts of the instruction are working as planned and which need refinement. Simply put, without assessment, there would be no systematic or reliable feedback to guide lesson delivery (teachers), lesson usage (learners), and lesson development and continuous refinement (instructional designers).

Assessment and Learning

Assessment can take many forms and serve different audiences; however, its fundamental purpose in instructional design is to improve the quality of learning as students "engage in the problems and discourse of a given area and are given encouragement, response, and feedback on what they do, as appropriate, with a view to them becoming more effective in their learning" (Boud, 1990, p.103). Effective learning is facilitated as students use metacognitive strategies to predict their performance on various tasks and to monitor their current levels of mastery and understanding (Bransford, Brown, and Cocking, 1999). Teaching practices congruent with a metacognitive approach provide ongoing assessments that help both teachers and students monitor progress and make instructional decisions accordingly (Bransford et al., p. 24).

According to Van Gog, Sluijsmans, Brinke and Prins (2010), if assessments during instruction are aligned with the outcomes desired, learners receive guidance on

their progress and level of mastery. That is, they "can work on a task, assess their performance on that task, decide which aspects of their performance need improvement, and select a next task to work on that will help them improve these performance aspects" (p.313). Without ongoing assessment, learners and instructors would operate in a vacuum, not knowing the degree to which lesson objectives are being achieved in time to make any adjustments. The instructional design literature consistently promotes assessment as an essential design component (Dick & Carey, 2001; Gagne, 1989; Morrison et al., 2013).

Empirical Support for Assessment

The earliest research on assessment dates back more than a century to the classic studies by E. L. Thorndike (1913) in support of the "Law of Exercise." Thorndike demonstrated that practice in the absence of knowledge of results (i.e., feedback) leads to no improvement toward mastery. Numerous studies have since been conducted on the use of various assessment-feedback strategies with different curricula and types of learners. To synthesize the research evidence, Bangert-Drowns, Kulik, Kulik & Morgan (1991) conducted a meta-analysis that examined the effects of feedback in "test-like events" present in text-based and technology-based instruction. Their analysis included 58 effect sizes from 40 studies, most of which were published between 1960 and 1990. Feedback had a moderate, significantly positive effect on achievement (effect size = 0.26). The authors found that one important mediating variable was the type of feedback. Effects were lower for feedback that merely indicated correctness of response as compared with feedback that informed the learner of the correct answer. According to Bangert-Drowns, et al., "Feedback's primary importance is in correcting errors" (p. 232), and it "is most effective under

conditions that encourage learners' mindful reception" (p. 233).

Given that feedback occurs as a natural product of assessment, what about the direct effects of testing itself? In a second meta-analysis of the same studies, Bangert-Drowns, Kulik, and Kulik (1991) examined the effects of frequent classroom testing. Results indicated that students who took at least one test during a 15-week period scored roughly 0.5 standard deviations higher (a strong effect) on criterion examinations than those who did not take a test. In addition, improved criterion performance was associated with more frequent testing, although testing more frequently than once every two weeks did not produce an additional benefit.

References

Bangert-Drowns, R. L., Kulik, J. S., & Kulik, C. (1991). Effects of frequent classroom testing. *Journal of Educational Research*, *85*(2), 89-99.

Bangert-Drowns, R. L., Kulik, J. S., Kulik, C., & Morgan, M. (1991). The instructional effect of feedback in test-like events. *Review of Educational Research*, *61*(2), 213-238.

Boud, D. (1990). Assessment and the promotion of academic values. *Studies in Higher Education*, *15*(1), 101–111. doi:10.1080/03075079012331377621.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). *How people learn: Brain, mind, experience, and schools.* Washington, D.C.: National Academy Press.

Dick, W., Carey, L., & Carey, J. (2001) *The systematic design of instruction* (5th ed.). New York: Longman.

Gagne, R. (1985). *The conditions of learning* (4th ed.). New York: Holt, Rinehart, and Winston.

Kulhavy, R. W., & Stock, W. A. (1989). Feedback in written instruction: The place of response certitude. *Educational Psychology Review*, *1*(4)*,* 279-308.

Kulhavy, R. W., & Wager, W. (1993). Feedback in programmed instruction: Historical context and implications for practice. In J.V. Dempsey and G. C. Sales (Eds.), *Interactive instruction and feedback*. Englewood Cliffs, NJ: Educational Technology Publications.

Morrison, G. R., Ross, S, M, Kalman, H. K., & Kemp, J. E. (2013). *Designing effective instruction* (7th ed.). Hoboken, NJ: Wiley.

Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, *18*(2), 119–144. doi:10.1007/BF00117714.

Sutton, R. (2010). Making formative assessment the way the school does business: The impact and implications of formative assessment for teachers, students and school leaders. In A. Hargreaves et al. (Eds.). *Second international handbook of educational change, Springer international handbooks of education 23*, DOI 10.1007/978-90-481-2660-6_49.

Thorndike, E. L. (1913). *Educational psychology: The psychology of learning.* New York: Teachers College Press.

Van Gog, T., Sluijsmans, D., Brinke, D., & Prins, F. (2010). Formative assessment in an online learning environment to support flexible one-the-job learning in complex professional domains. *Educational Technology Research & Development*, *58*(3), 311-324.

Reflection

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Effective course design must include opportunities for reflection as an extension of the Feedback/Review/Reteach standard. Reflection involves both instructor self-reflection and student self-reflection related to achievement of the purposes that have been articulated as the basis for the course. Such reflection is intended to deepen the learning experience and may serve as reiteration of purpose at key points during the course.

Background

Instructional design, once approached in a systematic step-by-step manner, is now understood to be a human-centered activity requiring new ways of discovering and understanding a problem or challenge. While the tools of the traditional model of design must be in the designer's toolbox, designers do not typically follow the step-by-step approach prescribed in these models (Kirschner, Carr, van Merriënboer & Sloep, 2002).

Design relies on the designer's judgment, which emerges from the accumulated episodes in an individual's history of design choices and their impact. These episodes are called design precedents (Tracey & Boling, 2013). No

single method of designing instruction can address every situation effectively. The designer must be prepared to frame a challenge or problem, generate a range of ideas based on previously encountered solutions or precedents, and interact with the end users to determine the best design solution. This method of design is messy and chaotic, requiring designers to continuously embrace uncertainty and reflect on their beliefs and precedents in order to arrive at a successful design solution.

Reflection-in-Action

A specific type of reflective practice, reflection-in-action emphasizes that unique and uncertain situations can be understood through attempts to reflect upon them while they are still in progress-- rather than in the past (Schön, 1983). Designers focus on problems or challenges by having a reflective conversation of the situation and then drawing on a repertoire of precedents to design solutions. Such reflection leads to new discoveries that lead, in turn, to additional reflections-in-action. Reflection expands designers' repertoires of precedents, which further develops their capacity to visualize and understand the world and increases their ability to be innovative in design.

Successful online courses require designers to reflect on their unique design constraints, including the limitations of learning management systems (LMS), the lack of traditional communication methods between instructor and learner; and the challenge of facilitating effective learner-to-learner collaboration—each of which may impede innovative design strategies. Considering a wide range of possibilities during online course design enables designers to refine the design and determine the appropriate choices for the delivery environment and for the needs of online users.

Reflection and Student Learning

Student reflection and self-assessment, incorporated through instructional strategies, is particularly useful in online course design. LMS tools promoting student engagement and reflection include discussion boards, reflection journals, and group discussions. Incorporating these strategies into the online learning environment can encourage student reflection on identified topics, expand thought processes, and integrate content into specific situations. Reflections also encourage growth through self-examination. Replacing "in class" discussion with online guided reflection questions, provides students with the opportunity to use reflection to explore course topics while developing their content knowledge and deepening the learning experience. Guided reflections also provide instructors with necessary feedback on student learning and may serve as an indicator of the need for remediation.

Empirical Support for Reflection

Reflection is generally identified as the personal and internal construction of knowledge through recursive observations and interpretations of one's experiences or beliefs. The use of reflective thinking and writing as a pedagogical tool has a long tradition in the practice of education. As early as 1910, John Dewey (1991) introduced the idea of reflection as a facilitator of learning. Journal writing in particular has been researched and implemented as a space for documenting reflection on experiences, beliefs, and knowledge (Pavlovich, Collins & Jones, 2009).

Dewey's original conception of reflection emphasized an open, holistic space for learners to engage in reflection, free from the imposition of outside structure, while other scholars have emphasized the value of prompts

as scaffolding to support novices in acquiring reflective skills. Contemporary research suggests that students, particularly when they are novices in a field, may benefit from scaffolding to guide the reflective process, including prompts that encourage them to draw connections between course content and personal experiences (Whipp, 2003). At the same time, it is crucial to align scaffolding with student development in order to ensure that prompts or other structuring activities continually push students to achieve greater complexity as their knowledge base grows and their reflective abilities mature (Ada, 2010).

Whipp (2003) found meaningful improvements in the levels of reflection among teacher education students after increasing the amount of scaffolding provided to students in an online course. Techniques that were found to be most effective in this study included tailored and general questions related to social, political, and moral issues, as well as prompts to draw connections between course readings and student experiences.

Reflective writing gives students the space to explore the stories they tell themselves about themselves, their experiences, and their beliefs (Bourner, 2003; Davis, 2006; Henderson, Napan & Monteiro, 2004; Luehmann, 2007). There is also an empirical basis for using reflective writing as a learning activity to engage students in examining their beliefs and integrating personal experiences into a framework of professional knowledge and identity (Hutchison & Tracey, 2014; Tillema, 2000; Tracey & Hutchinson, 2013; Tracey & Hutchinson, 2015; Tracey, Hutchinson & Grzeybk, 2014). In these instances, reflection was seen as a method to define and refine one's beliefs, values, and conceptual perspectives (Atkins & Murphy, 1993; Hong and Choi, 2011; Langley & Brown, 2010). As such, reflection becomes a crucial tool for the

formation of professional identity, which materializes in part from continuing, dynamic narratives and reinterpretations of relevant experiences in support of conceptions of the professional self (Luehmann, 2007).

In order to explore the ideas of professional development through reflection, Tracey and Hutchinson (2013) conducted a preliminary study examining how graduate students in instructional design use reflection to build their identity as instructional designers within a design-thinking framework. The subjects included 40 instructional technology graduate students across two semesters of a foundational online course in instructional systems design. As part of the course requirements, students were required to maintain a reflection journal, which was shared throughout the course with the instructor for feedback and assessment via Google documents. In addition, the online course included a case study component, which gave students hands-on experiences in developing instructional design plans. Because novice students may benefit from scaffolding in order to better understand concepts, the researchers used structured reflection in response to assigned topics or questions to spur narratives and interpretations. Lin et al. (1999) describe such prompts as providing "learners with a means of externalizing mental activities that are usually covert" (p. 49). While this study was preliminary in nature, it represents an important step in exploring how students can use reflective practice to develop the foundations of their professional identity. The data indicated that scaffolding via prompts and feedback can support students in moving from unproductive to productive reflection and can lead to development of an emerging professional identity. It is also important to remember that scaffolding practices need to take account of student progress and evolve to continue to

challenge students to improve the depth of their reflection (Ada, 2010).

The results of this preliminary study provided the impetus to move forward with a more detailed study, with the primary goal of developing a more sophisticated and nuanced understanding how graduate students in ID use reflection in relation to design precedents and professional identity. The secondary goal is to establish a more rigorous methodological framework for conducting this type of qualitative research.

For this follow-up study, the researchers used the Reflection Evaluation for Learners' Enhanced Competencies Tool (REFLCT), which was initially developed as a rubric to assess the reflective writing of medical students (Wald, Borkan, Taylor, Anthony & Reis, 2012). The REFLECT tool was designed with clear criteria for placing a response on the reflection spectrum, offering guidelines across multiple areas of potential reflection. After several design iterations, the final version of REFLECT achieved an ICC of 0.632 and a Cronbach alpha of 0.774.

The REFLECT rubric divides the reflective writing spectrum into four categories: 1) *habitual action* is associated with short responses typically characterized by basic, impersonal fact reporting and omission of important aspects of the response; 2) *thoughtful action* is more detailed and elaborate, but still remains on the factual level without moving into meaningful reflection; 3) *reflection* is viewed as writing that demonstrates effort to move beyond description to incorporate exploration, questioning, analysis, or some other form of meaning-making; and 4) *critical reflection* represents a thorough and thoughtful critical approach to any reflection domain (Wald et al.,

2012). REFLECT applies these categories across six domains of reflection: *writing spectrum*, which addresses the overall reflective quality; *presence*, which addresses authorial voice; *description of conflict*, which concerns the level of detail and insight in the description of a precipitating event or issue; *emotion*, which is related to the inclusion and exploration of emotion and emotional insight; *analysis*, which attends to the quality of meaning-making in the response; and *attention to assignment*, an optional category that addresses how well the response aligns with the writing prompt or task.

The primary goal for this research study was to conduct a descriptive analysis of how first-year graduate students use reflection to explore topics related to their development of a professional identity. Using the REFLECT rubric, 70% of all assessments were considered either reflection or critical reflection, clearly indicating that graduate students are able to respond to prompts covering design concepts, experiences, and identity attributes in ways that demonstrate the ability to examine, integrate, and analyze their beliefs, knowledge, and experiences.

Reflective writing has been used in medical education to measure student learning and development. In a study of reflective learning in medical students, formative feedback was found to be a crucial factor in both the development of reflective skills and in student engagement. Formal grading, on the other hand, a clearly summative evaluation, was not found to be an effective factor in fostering reflection (Vivekananda-Schmidt, Marshall, Stark, McKendree, Sandars, & Smithson, 2011). Peer feedback to support deeper reflection is an alternative also worthy of exploration; some studies have supported its use in fostering reflection (Hall & Davison, 2007; Maor, 2003; Vivivekananda-Schmidt et al., 2011), but there are also

indications that peer feedback may be associated with reduced reflective quality when compared with private reflective assignments (Xie, Ke & Sharma, 2008).

One of the key benefits of reflection is its connection to life-long learning. In other words, reflective learning assists students in acquiring the metacognitive tools to construct knowledge and engage in critical analysis of their own thinking, actions and experiences long after they leave a formal learning environment (Ada, 2010; Blaschke & Brindley, 2011; Bourner, 2003; Lin, Hmelo, Kinzer & Secules, 1999).

Reflection as it relates to professional practice has also been the topic of research. Schön (1983) was the first to connect reflection with professional practice through "reflection-in-action" and "reflection-on action." The former refers to the ongoing internal dialogue individuals have while confronting and attempting to solve a problem, while the latter refers to the individual's construction and revision of personal narratives around past experiences and beliefs as they encounter new experiences or gain new knowledge. McAlpine and Weston (2000) introduced a third category, "reflection-for-action," focusing on using past experiences to help shape future actions. Each of these reflection activities are relevant to instructional designers, as the goal of design is to solve instructional problems.

Research indicates that reflection-in-action is most effective when considering four aspects of design activity: designer, process, content, and context (Tracey & Baaki, 2014). The first of these is the most straightforward. Process refers to looking at design in two different ways: through rational problem solving and through reflective practice (Cross, 2011; Dorst, 2008; Schön, 1983). A specific aspect of context is how designers draw from a

repertoire of precedents inside and outside of the project (Brown, 2009; Cross, 2011; Dorst, 2008; Schön, 1983).

Baaki and Tracey (2014) researched reflection-in-action during design activity by studying designers from four design fields. Using criterion sampling, participants: 1) were involved in their own, real short-term project lasting between 37 to 87 days; 2) had at least five years of design experience; 3), were individually responsible for at least 75% of the design work, and 4) were engaged in a non-routine, non-procedural design project. This last criterion was chosen because a non-routine design is one that lacks a well-formed approach to a solution (Snider, Culley & Dekoninck, 2013). The study engaged each of the eight participants for a relatively long period of time (average of 64 days) through the life of a design project. Participants completed weekly reflection journals, participated in interview meetings, shared design artifacts, and reviewed design milestones.

Summary

Research on reflection indicates that it is a useful and an effective activity for designers while designing online courses and as an instructional strategy for students taking these courses. Reflection supports innovative course design, student content and knowledge acquisition, and student and designer professional identity development. Finally, reflective activities such as journal writing and the use of reflective prompts support instructor feedback in an online environment.

References

Ada, W. W. (2010). Computer supported collaborative learning and critical reflection: A case study of

fashion consumerism. *Interdisciplinary Journal of E-Learning and Learning Objects, 6*, 87-102.

Atkins, S., & Murphy, K. (1993). Reflection: A review of the literature. *Journal of Advanced Nursing, 18*(8), 1188–1192.

Baaki, J., & Tracey, M. W. (2015). Repertoire of precedents: designers kindling fatwood during reflection-in-action. In Hokanson, B., G. Clinton, and M. Tracey, (Eds.), *The design of learning experience: Creating the future of educational technology* (pp.155-166). New York: Springer.

Blaschke, L.M., & Brindley, J. (2011). Establishing a foundation for reflective practice: A case study of learning journal use. *European Journal of Open, Distance, and E-Learning (EURODL), Special Issue*. Retrieved from http://www.eurodl.org/materials/special/2011/Blaschke_Brindley.pdf.

Bourner, T. (2003). Assessing reflective learning. *Education + Training, 45*(5), 267-272.

Brown, T. (2009). *Change by Design*. New York: Harper Business. London: Berg Publishers.

Davis, E. A. (2006). Characterizing productive reflection among preservice elementary teachers: Seeing what matters. *Teaching and Teacher Education, 22*(3), 281–301.

Dewey, J. (1991). *How we think: A restatement of the relation of reflective thinking to the educational process*. Lexington, MA: Heath.

Dorst, K. (2008). Design research: A revolution-waiting-to-happen. *Design Studies*, 29, 4-11. doi: 10.1016/j.destud.2007.12.001

Hall, H., & Davison, B. (2007). Social software as support in hybrid learning environments: the value of the blog as a tool for reflective learning and peer

support. *Library and Information Science Research, 29*(2), 163–187.

Henderson, K., Napan, K. & Monteiro, S. (2004). Encouraging reflective learning: An online challenge. In *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 357-364).

Hong, Y., & Choi, I. (2011). Three dimensions of reflective thinking in solving design problems: A conceptual model. *Educational Technology Research and Development, 59*(5), 687–710.

Hutchinson, A., & Tracey, M. W. (2015). Documenting design ideas: How graduate ID students reflect on idea generation. *Instructional Science, 43*(5)*,* 527-544.

Kirschner, P., Carr, C., van Merriënboer, J., & Sloep, P. (2002). How experts designers design. *Performance Improvement Quarterly*, *15*(4), 86-104.

Lai, G., & Calandra, B. (2010). Examining the effects of computer-based scaffolds on novice teachers' reflective journal writing. *Educational Technology Research and Development, 58*(4), 421-437.

Langley, M., & Brown, S. (2010). Perceptions of the use of reflective journals in online graduate nursing education. *Nursing Education Perspectives, 31*(1), 12-17.

Lin, X., Hmelo, C., Kinzer, C., & Secules, T. (1999). Designing technology to support reflection. *Educational Technology, Research and Development, 47*(3), 43–62.

Luehmann, A.L. (2007). Identity development as a lens to science teacher preparation. *Science Education, 91*(5), 822-839. doi: 10.1002/sce

Maor, D. (2003). The teacher's role in developing interaction and reflection in an online learning community. *Educational Media International, 40*(1-2), 127-37. doi:10.1080/0952398032000092170

McAlpine, L., & Weston, C. (2000). Reflection: Issues related to improving professors' teaching and students' learning. *Instructional Science, 28*(5), 363–385.

Pavlovich, K., Collins, E., & Jones, G. (2009). Developing students' skills in reflective practice: Design and assessment. *Journal of Management Education, 22*(1), 37–58.

Schön, D. (1983). *The Reflective Practitioner: How professionals think in action.* New York: Basic Books Inc.

Snider, C.M., Culley, S. J., & Dekoninck, E. A. (2013). Analysing creative behavior in the later design process. *Mechanical Engineering*, 34, 543-574. doi: 10.1016/j.destud.2013.03.001

Tillema, H. H. (2000). Belief change towards self-directed learning in student teachers: Immersion in practice or reflection on action. *Teaching and Teacher Education, 16*(5-6), 575–591.

Tracey, M. W., & Baaki, J. (2014) Design, designers and reflection-in-action. In B. Hokanson and A. Gibbons (Eds.)*, Design in educational technology: Design thinking, design process, and the design studio*. (pp.1-13). New York: Springer.

Tracey, M. W., & Boling, E. (2013). Preparing instructional designers and educational technologists: Traditional and emerging perspectives. In M. Spector et al. (Eds.), *Handbook of Research on Educational Communications and Technology* (4th ed.). (pp.653-660). New York: Springer.

Tracey, M. W., & Hutchinson, A. (2013). Developing designer identity through reflection. *Educational Technology, 53*(3), 28-32.

Tracey, M. W., & Hutchinson, A. (2015). Uncertainty, reflection, and designer identity development. *Design Studies*, *42*, 86-109.

Tracey, M. W., Hutchinson, A. & Quinn-Grzebyk, T. (2014). Instructional designers as reflective practitioners: Developing professional identity through reflection. *Educational Technology Research & Development*, *62*(3), 315-334.

Vivekananda-Schmidt, P., Marshall, M., Stark, P., McKendree, J., Sandars, J., & Smithson, S. (2011). Lessons from medical students' perceptions of learning reflective skills: A multi-institutional study. *Medical Teacher, 33*(10), 846-850. doi:10.3109/0142159X.2011.577120

Wald, H. S., Borkan, J. M., Taylor, J. S., Anthony, D., & Reis, S.P. (2012). Fostering and evaluating reflective capacity in medical education: Developing the REFLECT rubric for assessing reflective writing. *Academic Medicine, 87*(1), 41–50.

Whipp, J. (2003). Scaffolding critical reflection in online discussions: Helping prospective teachers think deeply about field experiences in urban schools. *Journal of Teacher Education, 54*(4), 321–334.

Xie, Y., Ke, F. & Sharma, P. (2008). The effect of peer feedback for blogging on college students' reflective learning processes. *The Internet and Higher Education, 11*(1), 18–25.

Independent Learning

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Effective course design incorporates opportunities for independent learning, both instructor- and self-directed. Online course development, particularly in the asynchronous mode, should epitomize independent learning, which should include opportunities for feedback, review, and reflection—all of which should resonate with the purpose.

Background

Independent learning can be seen from two broad perspectives. The first perspective is as a general pedagogy, which Gunasekara (2008) describes as a pedagogy of questioning rather than a pedagogy of delivering answers. Independent learning can also be seen from the perspective of individual "ownership" of the learning process, which includes making informed choices about seeking guidance or collaborating with others, as independent learning does not mean learning in isolation (Field, Duffy & Huggins, 2014; Meyer, Haywood, Sachdev & Faraday, 2008; Mitchell, Zutshi & Weaver, 2010).

General Independent Learning Skills

Dependent and independent learners differ from one another in some fundamental ways. Dependent learners expect others not only to choose their goals and criteria, but also to regulate their learning experience (Rogers, 2012). In contrast, independent learners rely on self-regulation by trying a variety of strategies before asking for help, by seeking clarifications as needed, by acting on feedback, and by reflecting on their own progress rather than continually seeking approval (Murdoch & Wilson, 2006).

While essential to independent learning, self-regulation alone will not guarantee effective independent learning, whether online or in person. It merely demonstrates an individual's ability to conform to someone else's values and goals (Rogers, 2012). For instance, high achievers in traditional schools may be good self-regulators as they study according to assigned content and criteria, but if they lack ownership of their learning, they can feel lost, angry, or cheated when deprived of lectures and clear "correct" answers and are expected to choose their own values, criteria, and content; to assess themselves against their own values and criteria; or to decide what is valuable and what they should change (Gunasekara, 2008; Higher Education Academy, 2014; Knobbs & Grayson, 2012; Rogers, 2012; Warring, 2013). Ownership also affects motivation and satisfaction. Learners who negotiate a topic area and select a supervisor can be more satisfied with independent learning than those who feel forced into independent learning, are assigned a topic, and are given a supervisor who does not provide regular contact and support (Hunt, Scicluna & McNeil, 2011).

Importance for Distance Learning

Independent learning can perform an essential role in distance learning, regardless of whether a particular program is designed for synchronous or asynchronous study. If a program is designed for synchronous study, such as a live virtual classroom, television, radio, or similar approach, students may attend scheduled learning sessions; however, they may lack opportunities for face-to-face interaction with the instructor. While newer options for face-to-face digital contact exist, these require some planning and training in advance. Some synchronous instructors compensate for limited interaction by engaging students in discussion boards and one-on-one meetings--but many do not. In such situations, students have little direct interaction with instructors and often feel invisible or anonymous. As a result, students persist in their studies only as a result of their own initiative. Independent learning skills are crucial to maintaining that initiative.

Asynchronous instruction, such as self-study e-learning, workbooks, and the tutorial-style study in many programs, proceeds entirely at the initiative and pace of the student. In the case of self-study programs, students require independent study skills to schedule their own learning, engage regularly with material, and persist through the prescribed course of study. In the case of tutorials, students usually need to propose their own content and learning goals, which they finalize in consultation with the supervising faculty member. Online course development, particularly in the asynchronous mode, should include multiple opportunities for feedback, review, and reflection.

Skills for Independent Distance Learning

Regardless of the type of independent learning experience in distance education, two skills are essential for independent learning: acting with autonomy and acting with agency.

Acting with Autonomy

As previously noted, personal ownership of the learning experience is central to independent learning. Also central to independent learning is self-regulation (Meyer et al., 2008), which refers to the ability of a student to monitor, direct, and manage behaviors so that the student successfully completes the assigned learning. Self-regulated learners engage in a cyclical process of setting goals, choosing strategies, and measuring the ability to meet goals with those strategies. Self-regulation includes committing to a goal (Higher Education Academy, 2014), and applying a process to manage intrinsic motivation, confidence, and emotion (Meyer et al., 2008; Murdoch and Wilson, 2006), to manage time and pacing (Meyer et al., 2008), and to reflect on progress to adapt to and overcome obstacles to achieve the goal (Marshall, 2008; Meyer et al., 2008; Mitchell et al., 2010; Murdoch & Wilson, 2006).

Some will combine ownership and self-regulation under the broader concept of *autonomy* (Mitchell et al., 2010). Autonomy relates to control or the ability to make informed choices about a learning experience based on personal needs (Broad, 2006). Autonomy starts with deciding which objectives are worth pursuing and continues with choosing content on which to focus, the learning process to use (Higher Education Academy, 2014; Mitchell et al., 2010), and the criteria for determining success (Rogers, 2012). Autonomous learners apply their

own creativity during learning and draw on assistance as needed to produce a uniquely individual learning experience (Jones & Dexter, 2014; Mitchell et al., 2010).

Acting with Agency

Learners face three types of situations with varying expectations for control: 1) dependent learning, in which they rely on external sources such as an instructor for direction and motivation; 2) accredited learning, in which the learning objectives and evaluations are externally defined but flexibility exists in the way that learning proceeds; and 3) independent learning, in which they rely on themselves for most direction and motivation. Independent learners actively seek ways to influence or interpret an experience in a way that it furthers personal values and needs, even if they have limited control over the situation (Field et al., 2014).

Impact of Autonomy and Agency

As a result of their autonomy and agency, independent learners show higher motivation, confidence, and awareness of limitations. They also use more learning strategies, have higher standards and performance, and form their own opinions, which extends their learning (Meyer et al., 2008). In assignments, independent learners recognize their assumptions, exclude redundant information, and address ethical issues (Gunasekara, 2008). Provided with learning strategies, independent learners can use their own content to construct personally motivated learning experiences (Bishop, 2006). Independent learners are conscious of how they learn, enabling them to better control their learning experience outside of school, to question and improve practice in the workplace, to share their developing knowledge with their professional

community (Hunt et al., 2011; Jones & Dexter, 2014; Marshall, 2008) and to compensate for a lack of workplace training to meet professional needs (Jones & Dexter, 2014).

Designing for Independent Learning

Research suggests some general guidance in designing and facilitating distance education that promotes the development of independent learning skills. Many of these strategies are intended to promote autonomy and agency, especially among students who have not yet had opportunities to develop these skills.

Preparing Learners for Independent Learning

Developing the skills to learn independently requires explicit modeling, practice, and feedback during a learning experience (Silver-Pacuilla, 2008). If independent learning is simply assumed to be within the skill set of the students, then dependent learners may face frustration and blame the course or the facilitator for low contact time, lack of explicit specifications of what to do and how to do it, and not explaining how to use limited summative feedback to improve future performance (Rogers, 2012). Expecting dependent learners to seek help with generic study skills and apply what they learn would be expecting them to act like independent learners to solve their own dependent learning problems (Field et al., 2014). Dependent learners need to have their expectations reset (Higher Education Academy, 2014) and, when entering university, may require assistance with study skills, information literacy skills, and reflection (Field et al., 2014; Marshall, 2008).

Preparing Learners to Use Technology

Technology is no panacea for the challenges of independent learning. To the extent it fosters ownership and self-regulation (Meyer et al., 2008), technology can support independent learning by providing ways for learners to easily access resources, quickly measure their progress, and communicate with peers and facilitators to gather feedback (Meyer et al., 2008). But just as the skills needed for independent learning are not initially possessed by all learners, designers and instructors should not assume that students already have the skills to effectively use technology to support their learning. Some allowances need to be made for students to grow accustomed to the features of their online learning environment.

Designing for Learning Experiences

Dependent learning experiences, such as lectures, exclude learners from choosing content and setting pace, performing analysis and synthesis of content, or constructing explanations, all of which are done by the instructor (Mitchell et al., 2010). As a result, learners may retreat to merely doing only what is required to complete an instructor's assessments (Mitchell et al., 2010) rather than engaging in the deep learning the instructor hopes to spark. Certain experiential teaching strategies – such as case studies, site visits, speakers, games, and simulations – do not on their own create independent learning. They must integrate autonomy and agency into their designs, particularly through incorporating aspects of the "messy" real world (Gunasekara, 2008).

More fundamentally, when designing independent learning experiences, designers and instructors can shift away from organizing and teaching content (Bishop, 2006;

Meyer et al., 2008) and focus on teaching and supporting strategies for learning (Bishop, 2006). To promote independent learning, designs should help learners set their own objectives and assessments, choose and structure their own activities, and evaluate themselves (Marshall, 2008); choose sources of feedback; and even change the structure of their learning environment (Meyer et al., 2008).

In disciplinary materials, designs can demonstrate disciplinary experts explicitly modeling independent learning strategies such as motivation, planning, monitoring, pacing, and evaluation (Meyer et al., 2008; Mitchell et al., 2010), as well as critical strategies such as testing ideas and adapting them based on empirical evidence (Johnson and Harreld, 2012; Marshall, 2008). When they do so, experts can explain the rationales for their chosen strategies, think aloud as they use various strategies, and reflect on the results. The learning experience can include opportunities for learners to make use of similar processes (Field et al., 2014; Marshall, 2008) to build their confidence (Johnson & Harreld, 2012).

One other issue poses a challenge to designing learning experiences that foster independent learning in online settings. Some formal curricula, from which the distance education programs emerge, primarily focus on delivering content. That makes a shift to focusing on learning strategies difficult (Mitchell et al., 2010), because the philosophy of the curriculum conflicts with a revised approach to learning.

Integrating Student Interaction

Although they are independent, learning experiences need not be solitary. Students can work in dyads and groups to learn content and, in the process, work

through challenges about determining what to learn, how to structure the learning experience, and how to assess success. Regardless of whether such choices succeed or fail, instructors can encourage learners to reflect on the process critically to consider the effectiveness of their group work strategies (Mitchell et al., 2010) and how to improve them.

Providing Learners with Feedback

Feedback is essential both for independent learning and distance education, providing a link between the instructor and the learner and minimizing the anonymity of the experience. Formative feedback entails providing ongoing evaluations of work to help learners revise their approaches to learning to achieve improvements, while summative feedback means evaluating work when it is completed and not providing any opportunity to revise (Issa, Issa, and Kommers, 2014; Mitchell et al., 2010). In the case of formative feedback, the focus shifts from content to a mixed focus on content and learning processes (Mitchell et al., 2010; Stern, 2009).

Formative feedback is central to independent learning partly because it is a key component of self-regulation. Formative feedback allows learners to measure their success and adjust their approaches accordingly, which can strengthen the learning process, improve academic outcomes, and increase satisfaction (Issa et al., 2014). Formative feedback might relate to content, the independent learning process, or both. Content-focused feedback primarily assists learners with better mimicking the instructor's values and goals, while process-focused feedback assists learners with discovering how they can adjust their strategies to improve their learning (Marshall, 2008). Without feedback, learners persist with their current

approaches, perhaps unaware that doing so might not enable them to improve (Kirschner, Sweller & Clark, 2006).

Preparing Facilitators for Change

When designing independent learning experiences, instructional designers and facilitators rely on learner autonomy to allow for more focused work with particular groups as they need it (Meyer et al., 2008). However, this autonomy among learners is often not fully developed, which poses challenges to both instructors and learners.

One such challenge is that learner autonomy may require more time to develop and test than is required for simple delivery of content. Moreover, because of the focus on process over content, both learners and facilitators may not recognize the value of independent learning and it may be particularly challenging to implement these strategies in large classes (McLinden & Edwards, 2011; Mitchell et al., 2010). Facilitators might feel uncomfortable with these learning experiences due to having less control in "messier" independent learning environments and may fear negative impacts on teaching evaluations (Gunasekara, 2008).

Summary

Independent learning is a skill—both for learners and for learning designers. Learners skilled in independent learning can identify personal values and needs and make informed choices about their goals and the strategies required to meet them. They can engage in self-regulation as they try strategies, evaluate progress, adapt to feedback, and persist to overcome challenges. Finally, they can critically reflect on sources of knowledge and their own performance to determine how to adjust their goals and

strategies or even their values in response to differing contexts and perspectives (Hunt, Scicluna & McNeil, 2011; Marshall, 2008; Mitchell et al., 2010). Those who design distance education would be well-served by become fluent in design for independent learning.

References

Bishop, G. (2006). True independent learning—an andragogical approach: Giving control to the learner over choice of material and design of the study session. *Language Learning Journal*, 33(1), 40–46.

Broad, J. (2006). Interpretations of independent learning in further education. *Journal of Further and Higher Education*, 30(2), 119–143. http://doi.org/10.1080/03098770600617521.

Field, R. M., Duffy, J., & Huggins, A. (2014). Independent learning skills, Self-determination theory and psychological well-being: Strategies for supporting the first year university experience. Retrieved from http://eprints.qut.edu.au/73556/.

Gunasekara, C. S. (2008). Fostering independent learning and critical thinking in management higher education using an information literacy framework. *Journal of Information Literacy*, 2(2), 74–85.

Hunt, J. E., Scicluna, H., & McNeil, H. P. (2011). Development and evaluation of a mandatory research experience in a medical education program: The Independent Learning Project at UNSW. *Medical Science Educator*, 21(1), 78–85.

Issa, T., Issa, T., &. Kommers, P. (2014). Feedback and learning support that fosters students' independent learning: An Australian case study. *International Journal of Learning*, 19, 29–39.

Jones, W. M., & Dexter, S. (2014). How teachers learn: the roles of formal, informal, and independent learning.

Educational Technology Research and Development, 62(3), 367–384. http://doi.org/10.1007/s11423-014-9337-6

Johnson, B. A., & Harreld, D. J. (2012). Nurturing independent learning in the undergraduate student in History: A faculty–student mentoring experience. *Mentoring & Tutoring: Partnership in Learning*, 20(3), 361–378. http://doi.org/10.1080/13611267.2012.701962.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational psychologist,* 41(2), 75-86.

Knobbs, C. G., & Grayson, D. J. (2012). An approach to developing independent learning and non-technical skills amongst final year mining engineering students. *European Journal of Engineering Education*, 37(3), 307–320. http://doi.org/10.1080/03043797.2012.684673.

Marshall, G. (2008). Promoting independent learning by curriculum design and assessment in a taught postgraduate MRI programme. *Radiography*, 14(3), 238–245. http://doi.org/10.1016/j.radi.2006.11.001.

McLinden, M., & Edwards, C. (2011). Developing a culture of enquiry-based, independent learning in a research-led institution: Findings from a survey of pedagogic practice. *International Journal for Academic Development*, 16(2), 147–162. http://doi.org/10.1080/1360144X.2011.568699.

Meyer, B., Haywood, N., Sachdev, D., & Faraday, S. (2008). What is independent learning and what are the benefits for students? London: Department for Children, Schools and Families Research Report 051. Retrieved from

http://www.curee.co.uk/files/publication/[site-timestamp]/Whatisindependentlearningandwhatarethebenefits.pdf

Mitchell, M., Zutshi, S., & Weaver, D. (2010). An investigation into unit design for developing undergraduate independent learning abilities. In Proceedings of the 33rd Higher Education Research and Development Society of Australasia Annual International Conference (HERDSA 2010). Retrieved from http://researchbank.swinburne.edu.au/vital/access/services/Download/swin:18164/SOURCE2.

Murdoch, K., & Wilson, J. (2006). Student independent learning. *Education Quarterly*. Retrieved from http://lnnz2.vivid.net.nz/shared/professionalReading/JWGOALART.pdf.

Rogers, C. (2012). Transition, self-regulation, independent learning and goal theory. *Psychology of Education Review*, 36(2), 26–31.

Silver-Pacuilla, H. (2008). Investigating the language and literacy skills required for independent online learning. National Institute for Literacy. Retrieved from http://eric.ed.gov/?id=ED505199.

Stern, T. (2009). The role of formative assessment in enhancing independent learning and reflective teaching: some results of the Austrian IMST-Project. Retrieved from https://www.researchgate.net/publication/239922629_The_Role_of_Formative_Assessment_in_Enhancing_Independent_Learning_and_Reflective_Teaching_Some_Results_of_the_Austrian_IMST-Project.

Warring, S. (2013). A model of independent learning applied to the online context. *Quarterly Review of Distance Education*, 14(1), 25.

Evaluation

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Course evaluation must be purpose-driven. Alignment with the purpose should be threefold: a) based on acquisition of new knowledge, understandings, and skills; b) based on instructor self-evaluation; and c) based on student self-evaluation. Multidimensional evaluation offers a fully articulated basis for judging the success of the course and the students as well as providing information that can help shape future iterations of the course.

Background

Historically, the assessment of online learners and the design, development and evaluation of online programs and courses has been, by and large, a local concern of institutions and their faculty. However, in recent years, the issue of quality assurance in distance learning has been a growing focus of accreditation bodies, government regulatory agencies, and other interested parties. Once considered an afterthought by instructors and administrators, evaluation is increasingly becoming a central activity for educational institutions and for those who design distance learning programs and courses.

For the purpose of establishing instructional design standards for distance learning, assessment is distinguished from evaluation, in that the former focuses upon determining whether learners have achieved a desired learning outcome, while the latter implies making a value judgment regarding the quality of a distance learning course. Evaluation, assessment and research all involve gathering data, interpreting data, and making decisions, however, unlike research, the purpose of evaluation is "not to prove but to improve" (Madaus, Scriven & Stufflebeam, 2012, p. 118).

Purpose-Driven

Just as with the assessment of distance learners, evaluation of online courses can be done for formative or summative purposes (see Ross and Morrison, 2017 in this volume). Both formative and summative evaluation activities are undertaken to determine and address the quality of distance learning courses and both can be used as part of the continuous improvement process of systematic instructional design, albeit they are conducted at different stages of the process (Dick, Carey & Carey, 2015).

Formative Evaluation

Formative evaluation activities for distance learning courses are conducted while the development of the course is still in progress. Formative evaluation can occur during different stages of the course's development and can involve instructional designers, subject matter experts, faculty who may teach the courses, and students who are members of the course's target population.

Many useful standards and rubrics have been devised to facilitate the evaluation of distance learning courses. They can be utilized to: 1) describe the characteristics or features of high-quality courses; 2) identify specific strengths and weaknesses of a given course; and 3) provide guidance for how to improve courses before they are deployed to students. Popular standards and rubrics include Quality Matters (Maryland Online, 2017), California State University's Quality Online Learning and Teaching Instrument (California State University, 2017), iNACOL's National Standards (iNACOL, 2012), Blackboard's Exemplary Course Project (Blackboard, 2017), Illinois Online Network's Quality Online Course Initiative (Illinois Online Network, 2012) and the Quality Scorecard (Shelton, 2010). Links to each of these resources are found in the corresponding citations within the References section.

Summative Evaluation

"Formative course evaluation determines design flaws that may hinder a learner's acquisition of the desired problem solving skill" (Merrill 2013, p. 376). Summative evaluation activities are undertaken to judge the effectiveness of the course to aid learners in the acquisition of knowledge and skills once the design and development process is complete (Dick, Carey and Carey, 2015). Simonson (2007) notes that stakeholders want assurance that "the time and effort required to move to distance delivery of instruction produces a valuable educational experience' (vii) and advocates for the use of Kirkpatrick's Four-Level Model of evaluation for distance learning courses (Kirkpatrick & Kirkpatrick, 2016):

- Level 1 (Reaction): The degree to which participants find the training favorable, engaging and relevant to their jobs.
- Level 2 (Learning): The degree to which participants acquire the intended knowledge, skills, attitude, confidence and commitment based on their participation in the training.
- Level 3 (Behavior): The degree to which participants apply what they learned during training when they are back on the job.
- Level 4 (Results): The degree to which targeted outcomes occur as a result of the training and the support and accountability package.

Chang and Chen (2014) reported the results of a mixed-method study conducted with Kirkpatrick's Four-Level model. Results from 194 questionnaires and ten semi-structured interviews indicated that Kirkpatrick's model was an effective summative evaluation process for gauging learning effectiveness, return on expectations and return on investment. While the Kirkpatrick's Four-Level Model has been a stalwart in evaluation for nearly six decades, some are concerned about its dominance. Abernathy (1999) has warned that when those who conduct evaluations "regard the four-level approach as a universal framework for all evaluations, they tend not to examine whether the approach itself is shaping their questions and their results. The simplicity and common sense of Kirkpatrick's model imply that conducting an evaluation is a standardized, prepackaged process" (p. 20). As a result, alternative evaluation models may not be considered.

Multidimensional Evaluation

In a study investigating how faculty teaching online courses were being evaluated at different institutions, Píña and Bohn (2016) found that most institutions were using a single measure of evaluation data: end-of-course student evaluations. For those institutions that included the additional method of performing an "observation" of the online course, the majority used a rubric or other observation instrument based on the Quality Matters rubric--which is used primarily to evaluate the course design, not to evaluate the activities of an instructor who may not have designed the course. Evaluations at the former institutions suffered from a limited and incomplete data set, while the latter institutions suffered from using instruments that yielded the wrong data.

To be most effective, the evaluation of distance education courses should not be limited to a single measure and must be measuring the right things. Fortunately, learning management systems and student information systems are making "big data" information, including student demographics, past academic performance, retention/attrition rates, records of email and phone contacts with the institution, help desk records, and student activity within the LMS, more readily available. Unfortunately, the ability to access and utilize this data—without experiencing cognitive overload—is still under development.

Acquisition of New Knowledge and Skills

Faculty, instructional designers and administrators tend to be most interested in whether students acquire new knowledge and skills provided by an institution's distance

learning courses (i.e. Kirkpatrick's Level 2). Increasingly, legislators and the general public are insisting for evidence of student knowledge and skill acquisition to justify educational expenditures.

Common indicators of student learning outcomes include mid-term and final examination scores, samples of student writing, portfolios, reflection assignments and final grades. Accrediting agencies often request for evidence that course-level outcomes are linked to program-level outcomes. The latest generation of learning management systems (Blackboard, Canvas, Desire2Learn, etc.) all contain the ability to perform item analyses of individual test items and to map assignments to specified learning objectives at the course or program level. As these tools become more intuitive and their use more widespread, judgements about the effectiveness of a given course—and how to improve its effectiveness--can be based on more robust and precise data.

Student Self-Evaluation

Accrediting agencies are frequently requiring both direct and indirect measures of student success. Exam scores and related data satisfy the requirements for direct measures, while student satisfaction surveys are often utilized as examples of indirect measures. These can include 3rd-party nationally administered surveys, such as the Ruffalo Noel-Levitz Priorities Survey for Online Learners (Noel-Levitz, 2014) or locally-produced instruments. In a review of studies on student course evaluation surveys, Tobin, Mandernach and Taylor (2015) reported that answers on end-of-course student surveys tended to focus on students' view about their instructors, rather than about their courses.

Evaluation by students should include items that allow students to examine their own understanding, motivation and learning strategies that they employ in order to become self-regulated learners (Harris & Piña, 2014). The evaluation should have separate and distinct sections for evaluating the instructor and evaluating the course. Items relevant to course design may include asking whether: 1) the course interface is inviting and professional; 2) the course navigation is intuitive; 3) readings, instructional activities and media employed in the course facilitates the attainment of the learning objectives; 4) the course provided sufficient student-content, student-instructor and student-student interaction (Piña & Baird, 2014).

Instructor Self-Evaluation

As online learning continues to grow in prevalence within institutions and the number of online courses increase, it is becoming increasingly common that an instructor teaching a given distance learning course may not have been involved in the development of that course (Piña & Bohn, 2016). Instructors, along with their students, engage most closely and intimately with distance education courses and are in a position to provide highly relevant and valuable data for course evaluation. Many of the same questions asked of students about their courses can be asked of instructors, as the goal is the same: to be able to make a judgement regarding whether the course design facilitates or hinders learning and instruction and where improvements may be made (Piña & Baird, 2014).

Summary

Berk (2013) points out that there is an extensive literature base for studies of student evaluation of face-to-face courses, but that little attention has been given to the evaluation of online or blended/hybrid courses. An even greater deficit exist for studies into instructor evaluation of distance education courses. Given the present and future prominence of distance learning to students, faculty, institutions, accrediting agencies, regulators and others, the need for empirically-validated standards to guide that future, it will be critical for instructional design and distance education scholars to devote attention to increasing the evaluation knowledge base.

References

Abernathy, D. J. (1999). Thinking outside the evaluation box. *Training and Development 53*(2), 18-23.

Berk, R. (2013). Face-to-face versus online course evaluations: A "consumer's guide" to seven strategies. *MERLOT Journal of Online Learning and Teaching 9*(1), 140-148.

Blackboard (2017). *Exemplary course program rubric*. Retrieved from http://www.blackboard.com/resources/catalyst-awards/bb_exemplary_course_rubric_apr2017.pdf

California State University (2017). *Quality online learning and teaching (QOLT) instrument*. Retrieved from https://docs.google.com/document/d/1h-vcRbvjwhchpLbPVPnSAf9YgOEktFHMO6w5bFP8zbA/edit

Chang, N., & Chen, L. (2014). Evaluating the learning effectiveness of an online information literacy class based on the Kirkpatrick framework. *Libri:*

International Journal of Libraries & Information Services 64(3), 211-223.

Dick, W., Carey, L., & Carey, J. (2015). *The systematic design of instruction*, (8th Ed.). Boston, MA: Pearson.

Harris, B. R., & Piña, A. A. (2014). Incorporating self-regulated learning strategies in online courses. In A. A. Piña & A. P. Mizell (Eds.). *Real-life distance education: Case studies in practice* (3-20). Charlotte, NC: Information Age Publishing.

Illinois Online Network (2012). *Rubric: Quality online course initiative*. Retrieved from http://www.ion.uillinois.edu/initiatives/qoci/index.asp.

iNACOL (2011). *Version 2: National standards for quality online courses*. Viena, VA: International Association for K-12 Online Learning.

Kirkpatrick, J. D., & Kirkpatrick, W. K. (2016). *Kirkpatrick's four levels of training evaluation*. Alexandria, VA: ATD Press.

Madaus, G. F., Scriven, M., & Stufflebeam, D. D. (2012). *Evaluation models: Viewpoints on educational and human services evaluation*. New York, NY: Springer Science and Business Media.

Maryland Online (2017). *Non-annotated standards from the QM higher education rubric* (5th Ed.). Retrieved from https://www.qualitymatters.org/sites/default/files/PDFs/StandardsfromtheQMHigherEducationRubric.pdf

Merrill, M. D. (2013). *First principles of instruction: Identifying and designing effective, efficient and engaging instruction*. San Francisco, CA: Pfeiffer.

Noel-Levitz (2014). *2014-15 national online learners priorities report*. Coralville, IA: Noel-Levitz. Retrieved from www.noellevitz.com/Benchmark.

Piña, A. A., & Baird, C. (2014, June). *Evaluating distance education evaluation*. Presented at the annual Distance Learning Administration Conference, Jekyll Island, GA.

Piña, A. A., & Bohn, L. (2016). Assessing online faculty. In A. A. Piña, & J. B. Huett (Eds.) *Beyond the online course: Leadership perspectives on e-learning* (317-330). Charlotte, NC: Information Age Publishing

Ross, S. M., & Morrison, J. R. (2017). Assessment. In A. A. Piña (Ed.) *AECT instructional design standards for distance learning*. Bloomington, IN: Association for Educational Communications and Technology.

Shelton, K. (2011). A review of paradigms for evaluating the quality of online education programs. *Online Journal of Distance Learning Administration 14*(1).

Simonson, M. (2007) Evaluation and distance education: Five steps. *Quarterly Review of Distance Education 8*(3). vii-ix.

Tobin, T. J., Mandernach, B. J., & Taylor, A. H. (2015). *Evaluating online teaching: Implementing best practices.* New Jersey: John Wiley and Sons, Inc.

Design Standards: Online Learning Courses

Sample Rubrics

Following are sample rubrics to evaluate the extent to which each of the following design standards has been met.

1. Purpose. Effective course design begins with a clearly articulated purpose. This is the standard to which all other standards must align. Purpose may be thought of as two-dimensional: institution or instructor and student. The design should include both the purpose of the course as envisioned by the institution or instructor and the purpose as viewed by the student. As the purpose is articulated through goals and objectives, collaboration between instructor and student will set a firmer foundation than can be achieved through a one-dimensional purpose statement.

Purpose is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Purpose statement is multidimensional.	Statement incorporates multiple viewpoints and clearly articulates purpose as specifically applicable to the institution, the instructor, and the student.	Statement recognizes multiple viewpoints and is generally applicable to the institution, the instructor, and the student.	Statement is generally applicable but does not adequately address one or more viewpoints among the institution, the instructor, and the student.

Purpose statement incorporates collaboration.	Statement is made through collaboration between the instructor and the student.	Statement is a generalized reflection of instructor and student views.	Statement is not reflective of collaboration.
Goals and objectives are articulated.	Statement includes comprehensive elaboration through specific goals and objectives that are coherent and fully articulated.	Statement includes basic goals and objectives that are comprehensive and at least partially detailed.	Goals and objectives are missing or only partially developed.
Purpose is aligned with external requirements.	Statement aligns fully with external requirements, such as state or federal standards, and alignment is detailed and specific.	Statement generally aligns with external requirements with at least partial one-to-one correspondence.	Statement either does not fully align with external requirements, or there is little or no evidence that such requirements have been considered.

2. Assumptions. Course design must take into account assumptions that shape the purpose and subsequent course development. Most assumptions are based on students' prior knowledge and established understandings and skills; others may be derived from programmatic outcomes, such as curricular expectations or institutional requirements. Articulating these content assumptions provides a starting point for new learning. Assumptions in the case of online

learning also encompass students' ability to use delivery technology.

Assumptions are stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Students' prior knowledge	Students' prior knowledge is assessed in detail and such information is used as a primary factor to shape course design.	Students' prior knowledge is assessed in general terms and such information is used to help shape course design.	Students' prior knowledge is assumed rather than assessed.
Curricular expectations	Curricular expectations are clearly articulated and incorporated into the course design.	Curricular expectations are generally stated and used to shape the course design.	Curricular expectations are unstated or non-specific.
Institutional requirements	Institutional requirements are clearly articulated and incorporated into the course design.	Institutional requirements are generally stated and used to shape the course design.	Institutional requirements are unstated or non-specific.

Technology skills	Students' ability to use required technology is assessed and such information is a factor in course design.	Students' ability to use required technology is basically assessed and used to help shape course design.	Students' ability to use required technology is assumed rather than assessed.

3. Sequence. Learning opportunities must be sequenced in a manner that promotes efficient knowledge acquisition consistent with the prior-knowledge assumptions. Various models of sequencing—linear, spiral, scaffold, etc.—should be considered, and the course design should incorporate those strategies best suited to the content within the constraints of online delivery.

Sequence is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Sequence is consistent with prior knowledge.	Students' prior knowledge assessment is fully incorporated into the learning opportunities sequence.	Students' prior knowledge assessment is used in general terms to sequence learning opportunities.	Students' prior knowledge is not a major factor in determining the sequence of learning opportunities.

Sequence is varied in accordance with learning needs.	Various models of sequencing are chosen, based on the student's learning needs.	The sequencing model is chosen based on the student's learning needs but is relatively static.	The sequencing model is based on factors other than the student's learning needs.
Sequence compliments content.	The sequence models are well matched to content for optimal learning.	Sequencing generally compliments content.	Sequencing is determined independent from content.
Sequence optimizes delivery.	Sequencing is determined in order to provide a best fit within online delivery constraints.	Online delivery constraints are taken into consideration when choosing sequence.	Online delivery constraints are not well matched to chosen sequence.

4. Activities. Learning is achieved through activities both passive (reading, listening, viewing) and active (experimenting, rehearsing, applying). Activities should be chosen that best suit the content, students' levels of knowledge, experience, and ability, and online delivery constraints, particularly accommodating synchronous, asynchronous, and mixed course participation. Student self-selected or self-developed learning activities should be incorporated along with instructor-selected and instructor-developed activities, consistent with a two-dimensional purpose.

Activities are stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Activities are varied.	Activities combine a variety of passive and active forms of engagement.	Activities combine some forms of active and passive engagement.	Activities tend to be mostly limited to either active or passive engagement, not both.
Activities are matched to knowledge, experience, and ability.	Activities are chosen based on the student's specific level of knowledge, experience, and ability.	Activities generally suit the student's level of knowledge, experience, and ability.	Activities tend to be predetermined, rather than specifically related to the student's knowledge, experience, or ability.
Activities are self-selected or self-developed by the student.	Activities balance self-selected/self-developed options and instructor-selected/instructor-developed options.	The student's self-selected/self-developed activities are given consideration and included whenever possible.	Instructor-selected/instructor-developed activities dominate, with little accommodation for the student's self-selected/self-developed activities.
Activities match online delivery constraints.	Activities are highly adaptable and provide for synchronous, asynchronous, and mixed delivery.	Online delivery constraints are taken into consideration when choosing activities, and synchronous	Online delivery constraints do not accommodate both synchronous and asynchronous activities.

		and asynchronous activities are included whenever possible.	

5. Resources. A range of resources should be articulated to foster deep learning and extend course-centered experiences and activities. Resources should be multimodal to accommodate students' interests, understandings, and capacities, consistent with course content and technological accessibility. Resources should allow students to go beyond the constraints of the formal course structure to engage in self-directed, extended learning.

Resources are stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Resources foster deep learning.	Resources offer multiple, rich avenues to deepen understanding and extend learning beyond course content.	Resources are varied and provide avenues to deepen and extend course content learning.	Resources tend to be limited to course-centered content.

Resources are multimodal.	Resources are based on the student's specific understandings and capacities of knowledge, experience, and ability.	Resources generally suit the student's level of knowledge, experience, and ability.	Resources are general, rather than specifically related to the student's knowledge, experience, or ability.
Resources are consistent with technological accessibility.	Resources fully take into account technological accessibility to ensure that the student can use the resources both within the course structure and independently.	Resources generally recognize limits of technological accessibility and ensure that the student can fully use the resources.	Resources do not fully take into account technological accessibility, making some resources difficult or impossible for the student to use.
Resources encourage self-directed learning.	Resources are consistent with course content and provide avenues for the student to engage in self-directed, extended learning.	Resources are consistent with course content and at least some offer ways the student can extend learning through self-direction.	Resources are consistent with course content but may be difficult or impossible for the student to use in independent learning.

6. Application. Consistent with providing for active learning, students should have integral opportunities within the course design to apply new learning. Effective course design incorporates opportunities to practice newly acquired understandings and skills, both independently and

collaboratively, and to incorporate feedback. Online collaborative application opportunities should be developed using social and conferencing media, and offline collegial groups also should be structured whenever physical proximity of students affords this opportunity.

Application is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Application is integral to the course design.	Application offers multiple, rich opportunities to deepen understanding through practice of newly acquired skills and knowledge.	Application provides varied opportunities to deepen and extend course content learning through practice.	Application tends to be limited or isolated from course content.
Application provides for collaborative and independent learning.	Application provides many opportunities and encourages the student to work with others and independently to practice new skills and knowledge.	Application offers multiple opportunities for independent and collaborative practice of new skills and knowledge.	Application is limited and includes few opportunities for either collaboration or self-directed learning.

Application includes feedback.	Application includes rich feedback from the instructor and multiple student peers.	Application incorporates instructor and peer feedback.	Application includes only limited feedback.
Application incorporates collaboration outside the course setting.	Application is enriched through multiple opportunities for the student to interact with peers outside the course setting, using face-to-face as well as electronic modes of communication.	Application incorporates collegial interaction, both face to face and through electronic communication.	Application includes few if any opportunities for collegial collaboration outside the class setting.

7. Assessment. Regardless of the model of sequencing learning opportunities, the sequence should include points of assessment for purposes of feedback and review, with instances of review as necessary for students to acquire full understanding. Formative assessment, whether formal, informal, or incidental, allows teachers and students to give feedback to one another and to review the operationalized design in order to revise the course design based on students' input with regard to knowledge acquisition and effective use of new understandings and skills.

Assessment is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Assessment is formative.	Assessment is an integral part of the learning sequence to ensure that the student's acquisition of knowledge and skills is optimal.	Assessment provides for logical points of feedback and review over the learning sequence.	Assessment is limited or tends to be summative rather than formative.
Assessment is formal, informal, and incidental.	Assessment provides multiple opportunities for formal and informal review as well as encouraging incidental review whenever the need arises.	Assessment incorporates both formal and informal review and allows for incidental review when the need arises.	Assessment tends to be one-dimensional, either formal or informal rather than both.
Assessment fosters review of operational design.	Assessment is key to reviewing both the student's learning and the operational design of the course, which is flexible and subject to adjustment.	Assessment is used to review not only the student's learning but also the operational design of the course.	Assessment is limited to the student's learning.

Assessment makes use of student input.	Assessment is largely driven by student input in order to ensure optimal learning through operational redesign of the course on an ongoing basis.	Assessment incorporates the student's input in the revision of course design as needed.	Assessment is largely instructor-directed or instructor-determined.

8. Reflection. Effective course design must include opportunities for reflection as an extension of the Feedback/Review/Reteach standard. Reflection involves both instructor self-reflection and student self-reflection related to achievement of the purposes that have been articulated as the basis for the course. Such reflection is intended to deepen the learning experience and may serve as reiteration of purpose at key points during the course.

Reflection is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Reflection is an integral part of the operational design.	Reflection is integrated into the course design so that it occurs naturally at significant intervals as well as spontaneously when the need arises.	Reflection is included at regular intervals in the course design.	Reflection seems to be an after-thought, if it is included at all.

Reflection extends feedback and review.	Reflection provides a regular means of extending feedback and review activities and contributes to reshaping the operational design.	Reflection actively extends feedback and review activities.	Reflection may extend the feedback and review activities but that does not seem to be its central purpose.
Reflection includes both instructor and student self-reflection.	Reflection offers multiple opportunities for instructor and student self-reflection, both shared and individual.	Reflection incorporates opportunities for instructor and student self-reflection.	Reflection, when it occurs, is limited.
Reflection deepens learning.	Reflection is regularly employed as a means of deepening learning at all stages.	Reflection is consciously used to deepen significant learning experiences.	Reflection only serendipitously deepens learning.

9. Independent Learning. Effective course design incorporates opportunities for independent learning, both instructor- and self-directed. Online course development, particularly in the asynchronous mode, should epitomize independent learning, which should include opportunities

for feedback, review, and reflection—all of which should resonate with the purpose.

Independent learning is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Independent learning is incorporated into the operational design.	Independent learning is as important in the operational design as structured learning.	Independent learning opportunities are regularly occurring in the operational design.	Independent learning occurs or is encouraged only serendipitously or occasionally.
Independent learning includes feedback, review, and reflection.	Independent learning, through feedback, review, and reflection, helps to direct or redirect the course's operational design.	Independent learning parallels the operational design in terms of feedback, review, and reflection.	Independent learning is unstructured.

Independent learning is included in both synchronous and asynchronous activities.	Independent learning is incorporated in both synchronous and asynchronous activities but is particularly emphasized in asynchronous activities.	Independent learning is encouraged in both synchronous and asynchronous activities.	Independent learning, if it occurs, tends to happen only during either synchronous or asynchronous activities but not both.
Independent learning is both instructor- and self-directed.	Independent learning is equally valid and essential whether instructor- or self-directed.	Independent learning includes both instructor- and self-directed learning activities.	Independent learning, if it occurs, is either instructor-directed or self-directed but not both.

10. Evaluation. Course evaluation must be purpose-driven. Alignment with the purpose should be threefold: a) based on acquisition of new knowledge, understandings, and skills; b) based on instructor self-evaluation; and c) based on student self-evaluation. Multidimensional evaluation offers a fully articulated basis for judging the success of the course and the students as well as providing information that can help shape future iterations of the course.

Evaluation is stated.	□ Yes	□ No (If no, evaluation cannot be made.)	
COMPONENT	ADVANCED	ADEQUATE	INADEQUATE
Evaluation is purpose-driven.	Evaluation is fully aligned with the stated purpose(s) of the course and based on multiple factors; evaluation is used to shape future iterations of the course.	Evaluation is aligned with the course purpose(s).	Evaluation is only somewhat related to the stated purpose(s) of the course.
Evaluation is based on student acquisition of new knowledge, understandings, and skills	Evaluation incorporates multiple factors to judge the success of the student's acquisition of new knowledge, understandings, and skills.	Evaluation is multidimensional and fully takes into account the student's acquisition of new knowledge, understandings, and skills.	Evaluation does not fully incorporate an accounting of the student's acquisition of new knowledge, understandings, and skills.

Evaluation is based on instructor self-evaluation.	Evaluation is based on the instructor's self-evaluation as a co-equal element in the multidimensional evaluation of the course and its design.	Evaluation incorporates the instructor's self-evaluation of the course and its operational design.	Evaluation does not include or only partially considers instructor self-evaluation.
Evaluation is based on student self-evaluation.	Evaluation is based on the student's self-evaluation as a co-equal element in the multidimensional evaluation of the course and its design.	Evaluation incorporates the student's self-evaluation of the course and its operational design.	Evaluation does not include or only partially considers student self-evaluation.