

# Appendix A: Methods and Tools for Gathering Data

## Introduction

The methods and tools (also called instruments) used for analyzing online learning are similar to those used for evaluation. The five main methods are surveys, reviews, observations, extant data collection, and empirical studies (Boulmetis & Dutwin, 2014). They can be used in three stages of the WBID Model (analysis, formative evaluation in concurrent design, and summative evaluation). Each method is described in Table A.1.

## Data Gathering with Surveys

*Surveys* are used to canvas a target population or representative sample to collect views or opinions about a given topic or issue. By surveying more than one source or large pool of participants, designers, or evaluators acquire a more complete picture of the variety of perspectives on the instructional situation.

For example, a designer may investigate the technological functions of an online instructional design project by interviewing various stakeholders, such as the students, instructor(s), technical support staff, and administrators. The designer may find that each group holds similar views about how the technology functioned or may find that opinions diverge among the different groups. For instance, a technical support staff member might report that the technology was easy to install and little operating difficulties, while learners may state that they had major technical difficulties during their online learning experience. Both opinions, in one sense, may be “right” given each group’s perspective is based on their experience with technology, responsibilities within the instruction, and comfort levels with the instructional materials.

**Table A.1** Analysis and evaluation methods and tools

Stage	Method	Tool	Sample question(s)	Sample data
Analysis	Surveys	Questionnaire	Are goal(s), content, etc., accurate? adequate? etc.?	Identify opinions, self-report of skills
		Interview		
	Observation	Site visits, audio taping, video, etc.	How are tasks performed?	Record skills procedures, time, etc.
	Reviews	Experts and learners or employees	Where are the problems occurring? Is content complete? current? etc.?	Performance gaps, content needed, instructional situation
	Extant data	Assessment tools: tests, reports related to work, student/ personnel files, etc.	Does current process, instruction, technology, etc., work?	Test scores, absenteeism, customer complaints, public opinion, errors made, etc.
Formative evaluation	Surveys	Questionnaire	Is course accurate? complete? appealing? If not, should be changed?	Identify opinions, report of skills, etc.
		Interview		
	Observation	Course in action	Is technology functioning? Are student and instructor interactions effective?	Eliminate technical problems Effective instructional strategies employed
	Reviews	Experts and end-users	Are goal(s), content, etc., accurate? complete? current? etc.? If not, what needs to be changed?	Determine if goals, instructional strategies are congruent
		Extant data	Performance measures	Is the course usable, timely, successful? If not, what needs to be changed?
	Navigation devices and technology issues			
	Time measures			

(continued)

**Table A.1** (continued)

Stage	Method	Tool	Sample question(s)	Sample data	
Summative evaluation	Surveys	Questionnaire	Is course still effective, appealing, efficient, etc.?	Identify opinions, self-reports	
		Interviews			
	Observation	Course in action	How do students and instructor perform in the course?	Congruency of goals, instructional strategies, etc.	
	Review	Experts and end-users	Are goal(s), content, etc., still accurate? complete? current? etc.?	Identify learner's mastery of goal, ease of use, etc.	
	Extant data	Performance measures	Technology tools	Is the course still usable, timely, successful, etc.?	Record skills procedures, time, etc.
Evaluation studies	Pre- and posttest comparisons, comparative studies, case studies, etc.			Compare pre- and posttest scores on performance, attitudes Compare current to previous instructional delivery	

See additional information provided in Appendix B.

Gathering data through a survey method provides a broad perspective of an online course or program and is a way to triangulate data. (Recall that *triangulation* allows a designer to verify information using multiple sources for data or multiple methods or tools for data gathering). Triangulating data prevents reliance on a single data source or method and helps strengthen both the design of the analysis or evaluation and the information it yields (Creswell, 2014; Patton, 2015). In the previous example, the triangulated data revealed differing opinions among the technical support staff and online learners. If this result occurs during a formative evaluation, the designer may find it necessary to correct the apparent technical “glitches” and/or add tutorials about the technology. Such decisions are made once all pertinent data is gathered and analyzed during the formative evaluation.

### *Types of Questions*

Surveys use the tools of questionnaires (e.g., online surveys) or interviews (e.g., face-to-face, phone, or online) for gathering *cross-sectional data*, data that is collected at a single point in time (Johnson & Christenson, 2017). Designers may ask three main types of questions in a questionnaire or an interview—closed-ended, open-ended, and high gain.

## Closed-Ended Questions

*Anchored statements* provide defined words that explain, or anchor, a range of numerical choices. Respondents may find a range of choices more meaningful than a ranking or rating number alone. For example, an item stem may state that “online chats are ...” and have response values ranging from 1 to 5, with the 1 anchored with “extremely informative to me” and the 5 anchored with “not in formative at all.”

These types of statements are termed *closed-ended questions* because respondents are restricted to the choices in the rating scale. In some cases, such as a fixed alternative question, the responses are limited to yes/no or agree/disagree (Boulmetis & Dutwin, 2014). Closed-ended questions allow designers to quantify received information in terms of percentages, averages, or frequencies of responses (Fowler & Cosenza, 2009).

## Open-Ended Questions

*Open-ended questions* allow individuals to provide their own thoughts and ideas about a given question. Individuals respond in their own words and data take on a qualitative tone (Bickman & Rog, 2009). Opened-ended questions are useful in gathering specific information about learners’ and instructors’ experiences with online instruction. However, also note that responses can be very different from each other and may require further analysis by the designer or evaluator. It may be difficult to determine how different individuals’ comments compare to each other because of the subjectivity of both vocabulary and interpretation. Designers or evaluators will need to devise a coding scheme to categorize data into themes or factors. Several design team members should review the data to strengthen commonality of interpretation; in other words, to provide inter-rater reliability (Johnson & Christenson, 2016). However, an advantage of open-ended responses is that they can provide rich data for explaining how learners (and others) perceive the online instruction.

## High-Gain Questions

The third type of question, *high-gain*, allows designers to move beyond the initial response to an open-ended question and to probe for further details by asking follow-up questions. For example, if the responses to the question, “What were your favorite aspects of the course?” were either “I like the convenience of responding to questions and doing activities within my own time frame,” or “I enjoyed the topic on equity and access of technology,” the designer or evaluator could ask respondents targeted follow-up questions. For the first response, the follow-up question might be, “Does that mean you also prefer the threaded discussions to the online chats? If so, why?” The follow-up for the second response could be, “Did you enjoy the topic because of a personal interest or because of the way we presented it? Please explain.”

**Table A.2** Types of questions

Questions	Definition	Examples	Survey tool
Closed questions	Questions or statements that yield restricted responses	Was the site easy for you to access?	Questionnaires
		Do you have a computer at home?	Interviews
Open-ended questions	Specific questions or statements that allow individuals to answer in their own words	What were your favorite topics?	Questionnaires
		What learning activities were the most beneficial for you?	Interviews
High-gain questions	Follow-up questions or statements that allow probing for additional information	How changes would you make to the site? What other topics need to be covered?	Interviews

**Table A.3** Types of questionnaire items

Type	Example of item type
Limited choice, or close-ended statements	My main use of the Internet is for _____. <ul style="list-style-type: none"> <li>• Entertainment</li> <li>• School</li> <li>• Work</li> <li>• Social networking</li> </ul>
Open-ended questions	How you will use the information in your teaching? _____

The targeted nature of high-gain questions means that the designer or evaluator may generate them on the fly as an interview takes place. For online questionnaires can be created in a branching format to allow targeted follow-up questions based on a participant's response. The advantage is that well-constructed questions or items may yield additional insight into the perceptions, experiences, beliefs, and attitudes of the learners, instructor, or other stakeholders. Table A.2 presents examples of the three question types.

## *Questionnaires*

One of the main survey instruments is the questionnaire. It is most often used to obtain opinions about the content, instructional strategies, and the technological elements of the online course or demographic data on the instructor and/or participants (Boulmetis & Dutwin, 2014; Ciavarelli, 2003). Questionnaire items typically are in the form of a statement with limited, closed-ended, choices. Sometimes questionnaires include open-ended items that allow participants to make additional comments. Table A.3 provides examples of each item type.

Questionnaires are used to gather information quickly from participants about their experiences with the technology, instructional content, and pertinent demographics prior to the start of the course. Designers may then have participant

complete follow-up questionnaires during formative or summative evaluation to find out whether their skills (and other information) have changed in any way that might affect the design or delivery of the online instruction. Gathering such data ensures that the online instruction meets the needs of the learners, the instructor, and the organization in terms of efficiency, effectiveness, and appeal. Generally speaking, most universities administer course evaluation questionnaires at the end of the term to gain information about students' opinions about the course, content, and teaching.

Designers also use questionnaires to determine whether the participants found the instruction interesting, efficient, and effective. It is a tool to acquire benchmark and follow-up data for identifying trends in opinions, skill levels, and so on. A *benchmark* is a preestablished criterion for quality or success that guides the evaluation process (Boulmetis & Dutwin, 2014). Benchmarks provide baseline data for statistical analysis of questionnaire (or other instrument) responses. *Baseline data* are information gathered on the existing instructional situation that is then compared with data gathered about new interventions or innovations to determine whether any changes occurred.

The main purpose of the preliminary planning for a summative evaluation (Chap. 5) is to ensure that baseline data on the existing instructional situation can be obtained prior to the online course being adopted and implemented (Boulmetis & Dutwin, 2014; Salomon & Gardner, 1986). Again, the purpose is to determine whether (and how) learners' opinions have changed over a specified time period regarding such topics as directions provided, topics covered, information presented, and the instructional strategies used.

### **Anonymity and Confidentiality**

To protect participants' anonymity and confidentiality, it is good practice to have an external individual collect and compile the data (Yarbrough, Shulha, Hopson, & Caruthers, 2011). Information identifying participants should be removed and not used in subsequent communications and reports. When surveying respondents more than once, the evaluator may set up a coded identification system to identify respondents each time they are surveyed while maintaining confidentiality.

### **Distribution and Return Rate**

Questionnaires for online instructional design projects can be distributed using an email system or the LMS or as a link for an external Web survey tool. Questionnaires are considered a relatively easy way of collecting data, but the response rate of questionnaires is usually low. For example, a response rate of 25–30% is often considered good for an evaluation or researcher. End-of-course questionnaires distributed within universities often yield a different rate of return. The response rate for these types of questionnaires are often higher and as much as 80–85%. This higher

**Table A.4** Quantitative and qualitative questionnaire items

Items	Examples	Reporting results
Quantitative	Rate ease of use of the online course (with 1 being low and 5 being high) 1 2 3 4 5	Find frequencies, the mean, median, and mode for the ratings
Qualitative	Describe how well the technology worked for you. Explain whether you had any difficulties	Classify information into categories or conduct a factor analysis on the information

**Table A.5** Example of checklist and Likert scale items

Type of item	Example of item
Checklist	Mark with an X the age bracket group to which you belong: __ 25 and under __ 26–35 __ 36–45 __ 46–55 __ over 56
Likert scale	I find the video lectures extremely valuable. (1 = strongly disagree, 5 = strongly agree); 1 2 3 4 5

rate may be due to having a “captive” audience. There are various strategies instructors or institutions can take to increase the response rate. For instance, instructors can assign points or give extra credit for completing these questionnaires. Even simply sending reminders to complete the questionnaires can improve the response rate (Lowenthal, Bauer, & Chen, 2015).

### Developing Questionnaires

Questionnaires can be developed to provide quantitative or qualitative data, or both. Items anchored with numerical rankings or ratings can be quantified by totaling points or computing percentages. Items anchored by words are more qualitative in nature, but may provide quantitative data if responses are aggregated and reported in percentages. See Table A.4 for sample questionnaire items.

Questionnaires may be developed as checklists, wherein participants mark the most appropriate items that reflect their opinions, abilities, and so on. Checklists tend to be easier to answer than other types of questionnaire items.

Another format is the Likert scale. For example, the item, “I find the video lecture extremely valuable” could have responses ranging from a 1 (“strongly disagree”) to 5 (“strongly agree”). There is some debate over whether an odd or even number of responses is best. An even number of responses forces respondents to choose whether they agree or disagree with the statement; an odd number allows for a middle ground, either neutral or undecided. Table A.5 presents sample checklist and Likert scale items.

Supplying respondents with choices of “not applicable” or “do not know” may be beneficial when surveying for amounts of skills and knowledge about a technology and/or content. A sample questionnaire for evaluating an online course is shown in Figure A.1.

Name of Course:  
I periodically ask for feedback to change the course. Your input will be helpful and is greatly appreciated! Thank you, (Instructor's name).

**I. Please fill out the following demographic data:**

Gender: \_\_\_ Male \_\_\_ Female  
Age: \_\_\_ less than 25 \_\_\_ 25-34 \_\_\_ 35-44 \_\_\_ 45+

**II. Select the choice that best matches your responses at this point in the semester.**

I have a great deal of computer experience.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
The pace of the class is too rapid.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I use the Internet and Web frequently.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
The feedback I received was constructive.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I have taken a web-based course before.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I expected immediate help from my instructor when I had problems.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I sought help from my instructor.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
The topics in this course interest me.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I like being able to work at my own pace on course assignments.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I liked the small or whole group chats.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
There were too few scheduled class meetings.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I could get help when I had technical problems.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
The course is well organized.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I strongly recommend this course to other students in the field.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I had very few technical problems.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
We didn't need to have a face-to-face orientation meeting.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
The amount of feedback was appropriate.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I like working in groups or with partners.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
Technical problems I experienced were detrimental to my understanding.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				
I am satisfied with this course.	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
	<input type="radio"/>				

**III. Please enter any additional comments that might help me revise the course.**

Fig. A.1 A questionnaire for formative evaluation that includes items relating to demographics, prior knowledge and skills, and student opinions about course content, activities, and delivery

## Face Value of the Questionnaire

Face value, or face *validity*, is another feature to consider when using questionnaires. Face validity is the idea that a questionnaire [or other measures] appears to users to test what it is meant to test (Rust, Golombok, Kosinski, & Stillwell, 2014). If items on a questionnaire do not appear to address its purpose, respondents might question its face validity. However, appearances can be deceiving; the validity of an instrument is in fact determined by the evidence that allows for confidence in the score-based inferences drawn from using it (Miller, Linn, & Gronlund, 2013).

Another consideration with this type of data collection is the evaluator's confidence that participants have responded to each item appropriately and that the data are accurate. Questionnaires require an honest self-report of information; without this expectation, the results are suspect (Kirkpatrick & Kirkpatrick, 2006). When developing and administering a questionnaire, the designer or evaluator should stress the importance of honest responses.

## Determine How to Sample the Population

For analysis or evaluation, the designer determines whether to survey the whole group (if small in number) or a sample. If the course is very large (e.g., in the hundreds), it may not be necessary or even possible to survey all learners. When conducting a random or stratified random sampling of a population, it is important that respondents are representative of the entire population and any of its subgroups (Boulmetis & Dutwin, 2014). Using sample groups reduces the costs involved as well.

## Benefits of Using Questionnaires

The advantage of using questionnaires is the amount of information that can be collected in a short period of time from a cross-section of a target population. Further, respondents can answer with relative ease (especially if it consists of closed-ended questions) and answers are relatively easy to score, analyze, and report.

## Drawbacks of Using Questionnaires

As with any tool, there are drawbacks to using a questionnaire. One is the lack of security regarding who is in fact responding when an instrument is sent through emails, an LMS, or online survey system. Palloff and Pratt (2013) suggest that it is almost impossible to make online environments completely secure. However, security can be increased by specifying a limited time frame for responding and by requiring respondents to reply using access codes.

Concerns about lack of confidentiality may be another drawback for individuals returning questionnaires. When learners share their opinions or beliefs about a course and/or instructor, they need to be assured that their comments and their personal identity and privacy are protected (Ko & Rossen, 2017; Palloff & Pratt, 2013).

Using a variety of strategies can minimize confidentiality breaches. To help maintain confidentiality, the evaluator or designer can provide participants with a code to be used in place of their names. The LMS subsystem or Web applications such as *Survey Monkey* and others, can be used to create the instruments. With these applications, individual responses and identity can be protected and confidential. Additionally, having another individual collect the data and remove identifying information before sharing the results with the instructor, designer, or other stakeholders enhances the degree of confidentiality. With questionnaires relating to opinions about the course, aggregate data should be reported, rather than raw data from individual participants.

Another possible drawback of questionnaires is low response rate. Making responding easier by using Web-based applications and automated tracking of respondents may promote higher response levels. Additionally, simply sending out reminders to the sampling group could increase the response rate.

Finally, questionnaires are *self-report instruments*, in which individuals record their own recollections, opinions, attitudes, and judgments about an online course. They also may be subject to anecdotal bias (Sherry, 2003).

## ***Interviews***

### **Developing Interview Questions and Checklists**

As with questionnaires, interviews can use close-ended, open-ended, or high-gain questions to survey participants about an online course. For example, a closed-ended question in an interview may be, “Do you have a mobile device to bring school?” This yields a specific answer, but is limited in quality of information. An example of an open-ended interview question is, “What types of technology do you use most at home, work or school?” This type of question allows respondents to provide details.

Interviews may be either standardized or semi-structured. With a *standardized* interview, every interview is administered and scored in the same manner. A *semi-structured* interview uses a set of questions that allows respondents to respond in a number of directions. Each subsequent direction leads to a prescribed set of questions for the interviewer to ask (Boulmetis & Dutwin, 2014).

Interviewing small groups or individuals allows high-gain questions to be asked, the responses recorded, and follow-up questions added when necessary. These follow-up questions may be already devised (as in a semi-structured interview), which supplies consistent interview data. Interviewers also may generate new questions during the interview, which is a less consistent way to gather data. When this hap-

pens, the interview becomes an unstructured interview to allow the interviewer complete freedom to ask any questions as long as it relates to the interview’s purpose (Boulmetis & Dutwin, 2014). Unstructured interviews can be difficult to analyze and interpret responses or find commonalities among them.

To help facilitate data collection during an interview, the interviewer could have an interview checklist with each question and its corresponding answer set (including space for unanticipated responses) and would mark responses as they occurred.. A sample interview checklist is shown in Figure A.2.

Date:	Time:					
Subject:	School:					
Title:	City/State:					
Interviewer:	Others Present:					
How long have you been a principal/teacher/aide?	1yr	2-5yrs	6-10yrs	11-15yrs	16-20yrs	21+yrs
How long have you been at this school?	1yr	2-5yrs	6-10yrs	11-15yrs	16-20yrs	21+yrs
What did you do before coming to this school?						
Which best describes your computer skills?	Novice	I get by	Pretty Good	Expert		
What kinds of informal technology training have you had?						
What kinds of formal technology training have you had?						
How do you think technology should be used in classrooms?						
How was your official technology plan created?						
What was your role in developing the technology plan?						
When was your Technology plan first created?	Last 6 months	6-12 months	1-3 years	4-6 years	7-10 years	Over 10 years
When was your Technology plan last updated?	Last 6 months	6-12 months	1-3 years	4-6 years	7-10 years	Over 10 years
Who gets a copy of the plan?						
How do you use the plan?						
How is technology used in the school?						
Where is training offered?	Classroom	Labs	Other schools	Central District office	Other	
When is training offered?	Planning days	Early Research Days	After School	During School	Other	
Other Comments						

Fig. A.2 A sample interview checklist with anticipated responses and space for unanticipated responses

## **Conducting Interviews**

Interviews may be conducted in person, by phone, or on the Web (e.g., with Web Conferencing software). Chatrooms within the LMS might be another possibility for interviewing, especially if a focus group is being conducted.

During an interview, questions should not cue, or lead, respondents to answer in a particular way. Interviewers must take care to not make comments, provide nonverbal cues, or use tone of voice or text to trigger participants' responses.

Interviews can be used with both individuals and small focus groups (Fitzpatrick, Sanders, & Worthen, 2011). Organizational stakeholders possess different perspectives about online instruction and should participate in evaluations. Teachers, technical and administrative support staff, students, administrators, and parents may all have differing views about the use of the Web in PK-12 schools, for example. Individuals at differing status levels, such as top managers, division leaders and staff, would differ in their opinions within an organization. To draw out perspectives from stakeholders at these differing levels, the evaluator or designer may need to interview separately a representative group from each constituency (Joint Committee, 2011). To draw out perspectives from stakeholders at different levels, designers should interview stakeholders at various levels separately (Yarbrough et al., 2011). Separate meetings with small, homogeneous focus groups may encourage respondents' comfort level in responding to sensitive questions (Fitzpatrick et al., 2011).

The interviewer records all responses regardless of the interview format or method. Interviewees must agree to being recorded and should be informed before the interview begins how the information will be used and reported. Confidentiality should be discussed with interviewees at that same time.

## **Benefits of Interviewing**

Interviews allow the collection of in-depth, rich data. Such data can be informative by providing positive and negative examples, allowing additional probes into statements, and permitting participants to share additional information. The quality of the data gathered depends on the quality of the questions and the experience level of the interviewer.

When small-group interviews are used, the comments of one respondent may trigger responses by others and thus allow a brainstorming effect to take place. Such brainstorming may help generate additional and valuable information that might never appear when interviewing one person at a time.

## **Drawbacks of Interviewing**

Time constraints are the major hindrance with interviewing. The breadth of information gathered can also be limited. Interviews cannot last for long periods of time: a maximum of 90 minutes is recommended to limit fatigue among adults (20–30 min when interviewing children).

The number of people who can be interviewed (whether individually or in small groups) is limited due to the nature of this tool and the difficulty in following a discussion when too many individuals are involved at one time. Because only a small number of respondents may be involved in an interview, evaluators need to ensure that they fairly represent the organization's population.

Another drawback to using interviews is the time it takes to transcribe and code data into meaningful information, the accuracy of the transcripts, and the evaluator's ability to code, analyze, and interpret the data. In addition, bias may influence both the questioning and interpretation; potential sources of bias should be identified in the evaluation documentation.

As noted, group interviews may spark brainstorming; however, they also can trigger the phenomenon of groupthink. *Groupthink* occurs when individuals respond in complete agreement with one another and accept discussed information or decisions without asking questions or providing any contradictory opinions (Anderson, 2015). If this phenomenon occurs, the interviewer must attempt to break the cycle by posing a controversial question or playing devil's advocate.

## Data Gathering Through Observation

### *Methods of Observation*

Observation can provide rich, detailed descriptions of an online course. In an online course most actions and interactions (discussions, submitted work, chatrooms, etc.) are recorded (Boulmetis & Dutwin, 2014) and available for observation. Thus, observation can occur by reviewing an archived course or by lurking. *Lurking* occurs when an individual logs into a course and views the discussion or group activity, but does not interact with the group directly.

Other messages, such as emails from the instructor to the group or to individuals provide information about the clarity of directions, type and amount of technical problems, and the type and amount of instructor feedback. Access to email allows designers or emails to track when and how often difficulties occur and whether they change as the course progresses. When using an LMS, programs can be installed that capture email that is distributed through the system. However, it may be difficult to capture all of the interactions among participants using only the email system.

Through observation, an evaluator can monitor the level of participation. Most LMSs have reporting and analytic tools that can track the number of times that an individual posts information, when they post, and the total number of postings over time. An LMS may record other aspects of user activity such as identify what pages or tools are being accessed, how much time is spent in the pages, and any incorporated activities. Enable an evaluator to generate reports on how students interacted in a course.

In addition to monitoring the frequency of participation, the quality of interaction can be observed and analyzed through discourse analysis of transcripts. In discourse or content analysis, classification systems are used to place participant responses into categories. For instance, Davidson-Shivers et al. (2013) classified archived transcripts of online discussions into substantive and nonsubstantive categories that facilitated data analysis.

### **Ethics of Observing**

When using observation, the designer or evaluator should bear in mind the ethical consideration of learner and instructor privacy. In some respects, observing an online course is far less intrusive than observing in an on-campus class setting because of the level of invisibility to the online participants. Hence, instructors or teachers might not be made aware that their administrator is observing them. As such, this lack of visibility can be very intrusive and may be the subject of major disagreements in PK-12 schools and university among other settings. To resolve policies about observations should be in place. Ethically speaking, online participants need to be notified in advance that they will be observed, the purpose of the observation, and that confidentiality will be maintained (Yarbrough, et al. 2011). Participant permission should be gained before observations begin.

### ***Benefits of Using Observations***

One of the obvious benefits of observation is being able to see the context and the richness of detail that might not be available through other methods of data collection. Conducting several observations enables an evaluator to see how changes occurred over time, such as the development of a community, improved argumentation skills, and so on.

### ***Drawbacks of Using Observations***

Observing, transcribing, and coding data are time-consuming tasks. The amount of information, although rich in detail, may be not be easily analyzed and may not yield useful information.

The Joint Committee (2011) suggests that evaluation of instruction affects individuals in a variety of ways and that observation can be construed as invasive in the learning environment. Yarbrough et al. (2011) would concur. Evaluators must take care to safeguard the rights of individuals (the right to know, the right to privacy, etc.) (Palloff & Pratt, 2013). Advising participants that they may be observed, maintaining confidentiality, and limiting access to such information protects these rights.

## **Data Gathering Through Extant Data Collection**

Extant data is data that already exist within the organization, the online instruction or its website. Documentation of the online instructional design process and the course website can be reviewed for instructional effectiveness and ease of use by instructors and learners. These materials can be evaluated in terms of relevancy, timelines, and completeness. For instance, navigation devices may be already included in the LMS to determine the pathways that participants use and whether they functioned as designed. Evaluators or designers may investigate how learners and instructors move through a lesson. Most LMSs record the time in and out of the system. This timing feature provides a gross estimate only of online time, since it is impossible to determine whether individuals are actually working on the lesson, attending to something else, or have stepped out for coffee.

Participant assignments, tests, independent work, and resulting scores are considered extant data. For example, completed tests and assignments allow an evaluator to investigate how well learners performed based on stated goals and objectives. These types of documents differ from observations because of the intended focus. With extant data, the designer or evaluator is focused on the scores in order to make inferences on the success of the online instruction. With observation data, however, the focus is on the just-in-time interaction and activity of the participants.

### ***Benefits of Using Extant Data***

Extant data provides documentation on performance during the instructional period. When analysis is conducted throughout a course offering, assignments and assessments show performance over time. These performance measures help determine whether the online instruction facilitated the attainment of the instructional goals and the objectives. They might help explain why the instructional goals were or were not achieved.

### ***Drawbacks of Using Extant Data***

A concern with extant data collection is that the data are only a snapshot of information. The samples that an evaluator selects may not be typical for that group or individual nor might they reflect changes within the group across time. A random or stratified random sampling of the data may help increase the likelihood the data sample will fairly represent the population.

Another concern is with the measures for assessing learner performance (i.e., exams and quizzes) used within the online course or program. Often tests and quizzes are instructor developed may not have good reliability, which may make

the data also be less reliable. Developing exams and quizzes using criterion-referenced test development guidelines (Shrock & Coscarelli, 2007) might improve a tests' validity.

A second drawback is related to privacy and electronic data collection devices. Sherry (2003) states that “the availability of data does not imply open access” (p. 443). A growing number of educators today question how much data institutions collect on learners and how that data is used (Pardo & Siemens, 2014). As previously stated, participants have the right to know what is being reviewed and collected and for what purposes (Joint Committee, 2011). Maintaining privacy for individuals who share information is essential, especially when it is pertinent to an individual's personal life or professional career. E-communications often carry names, URLs, and other personal information and, if possible, should be *scrubbed* (stripped of identifying information) or protect the documents in some manner before sharing the raw data with others.

## **Data Gathering with Expert and End-User Reviews**

Evaluation can be conducted through expert and end-user reviews. Experts review the design plan, product, and/or the implementation for the courses effectiveness, efficiency, and appeal. Subject matter, instructional design, and technical experts are just three types of reviewers typically used in evaluation of online instruction. End-user review is useful because these individuals provide information about the online course or instructional setting from a learner's perspective. (See additional information provided in Appendix B.)

### ***Subject Matter Expert Reviews***

A subject matter expert (SME) reviews materials for accuracy, completeness, and clarity of the content. SMEs either know the instructional content, have teaching/training expertise with the target audience, or have technical knowledge and skills. SMEs provide background information and review the instruction for accuracy. They identify additional information, both that is necessary or essential to make the content complete and that is helpful, but not necessarily essential for learning. Experts also may identify additional resources for the course (Dick, Carey, & Carey, 2015).

Teaching or training experts could validate content and sequence, provide information about specific instructional strategies that facilitate learning, and identify any errors (Smith & Ragan, 2005). They could help determine how easily the course can be modified. They also are a resource for identifying pertinent characteristics of prospective learners.

### ***Instructional Design Expert Reviews***

Instructional design (ID) experts review the instructional situation and the instructional strategies that are incorporated into the instruction (Dick et al., 2015). They review the assignments, exercises, and assessments for educational soundness and congruence with stated goals and objectives. They check materials for completeness, interactivity, clarity, and feedback. They also review the online instruction and its website for graphic and message design in terms of effectiveness and appeal.

### ***Technical Expert Reviews***

Technical experts review the course for technical and accessibility issues. They provide technical specifications needed for the online course and the setup of its website during the design process. They also review the website for its ease of use, compatibility with various technology tools and software applications and the download speeds of individual Web pages during implementation, they check for errors and weaknesses with connectivity and provide suggestion and solution on how to correct those technical problems.

However, as higher educational institutions and other organizations offer more courses online, technical experts might conduct less systematic reviews of each online course to focus on solving just-in-time technical issues and/or work on achieving long term institutional goals.

### ***End-User Reviews***

End-user reviewers typically are selected from the prospective learners or from the actual target group. In some analysis or evaluation situations, the online instructor or trainer is included in end-user reviews. End-users provide information about their needs, abilities, and interests to the analyst to define the learner characteristics and entry-level skills. They may also review the course's design plan and prototypes in their preliminary states to provide early input on applicability and appeal. Among other things, they offer information on whether directions are clear, examples relevant, and exercises useful. They, too, identify errors in information presented or the functionality of the course, sharing perceptions on ease of use and completeness.

### ***Benefits of Using Reviews***

Use of expert and end-user reviews of course design plans and prototypes has been a traditional way for instructional designers to determine the quality of instruction and to improve that instruction. All of these experts provide different perspectives of the course—content, instructional, and motivational strategies, and technical aspects of the online course. End-user reviews may provide a “fresh pair of eyes” and may find things overlooked by the designer and instructor due to their familiarity with their design project and content.

### ***Drawbacks of Using Reviews***

Using reviewers can be expensive because many experts require remuneration for their time and efforts. End-users may need to be compensated in some manner for their time and effort as well. Such reviews take time to complete and to analyze the findings. Reviewers, either expert or end-user, need to be reliable and dependable so that they provide useful information in a timely fashion; otherwise, the online design may be stalled.

## **Data Gathering Through Evaluative or Research Studies**

Another method for gathering data is to set up evaluative studies using an empirical approach. Conducting evaluative studies usually occurs in summative evaluation rather than in analysis or formative evaluation. Several types of studies can be used to evaluate online learning such as benchmarking, self-study, case studies, and experimental studies.

### ***Benchmarking***

The Institute of Higher Education Policy (2000) identified 45 benchmarks in seven categories such as institutional support, course development, teaching and learning process, and so on that can be used to ensure the success or quality of distance education or any type of technology-mediated education. Benchmarking (gathering information) from instructor and learners periodically throughout an online course or program identifies any changes in performance, attitudes, frustration level, and experiences with online learning as participants become familiar with the technology and flow. Several methods and tools can be used for benchmarking (questionnaires, interviews, etc.), all of which yield data that designers or evaluator can later compare (Merisotis & Phipps, 2000; The Institute of Higher Education Policy, 2000).

## ***Self-Study***

Self-studies are often used by accrediting agencies to evaluate organizational performance (LaBoseky, 2004; Sherry, 2003) and can be subject to anecdotal bias. According to Sherry (2003), their purpose is to examine the operational and administrative aspects of course and program design. With course design, self-study is a way to examine effectiveness and appeal of the online instruction through participant reports on the goals, activities, resources, accomplishments, problems and impacts of the course. Observations may be necessary to triangulate data and to verify that the self-study reports are accurate and unbiased. For online course and programs, observation might be used with independent experts to validate (or not) accuracy of the self-study findings. Observation might be conducted through site visits, where an evaluation team reviews and verifies an organizations self-study.

## ***Case Studies***

Case studies are similar to self-study in that they are detailed studies and descriptions of a single course, program, or instructional material in its setting (Yarbrough et al., 2011). The difference between the two is that case studies are specifically focused on identified evaluation and research questions. Multiple tools are used to gather and analyze data, and the result is a detailed report of specific information about a particular situation. With case studies, care must be taken to not over interpret the data or generalize to dissimilar situations.

## ***Experimental-Control Group Studies***

Another empirical approach is the experimental-control group methodology. A detailed discussion of this methodology is beyond the scope of this book, but we note here that evaluators need to follow proper research guidelines, such as controlling the effects of intervening factors that may affect the validity of the study (Creswell, 2014; Johnson & Christenson, 2016). An experimental-control group study could be used to investigate the effects of variable such as one type of instructional strategy versus another type of instructional strategy treatments on learner performances and preferences.

Planning an experimental-control group study may be difficult in most online learning situations because of small class sizes or the inability to randomly assign participants to experimental and control groups. Instead, it may be preferable to use comparison groups in which participants are assigned to one of two or more types of treatments. In this manner, all participants are receiving some type of treatment

and their scores are then compared to each other rather than comparing a treatment to no treatment group. The caveat is that in this case, evaluators must not over interpret the data in terms of the effectiveness of one type of treatment over another.

### ***Pre- and Posttest Design***

Another approach that can be used to evaluate an online course is a pre- and posttest design, which examines how scores change as a result of an intervention (Creswell, 2014). It could be used, for example, to investigate learner attitudes and/or performance over a semester. This type of evaluation allows for the total group of participants to be included in the study. Through statistical procedures the difference (gain scores) can be determined between the pre- and posttest data. Evaluators should be aware that threats to validity may be encountered such as pretests cuing participants to the important topics, which may influence the actual gain.

### ***Benefits of Evaluative Studies***

Evaluative studies provide an empirical approach to evaluation. They can provide meaning, as well as statistical significance, to the effects of the online instruction on learner performance and to the opinions of its participants about the value and workload of the course.

### ***Drawback of Evaluative Studies***

It can be difficult to set up a well-designed, valid study. Online courses often lack enough participants or a controlled environment to limit the power of the investigation. Limited time and resources to conduct may adversely affect its validity.

### **Data Gathering with Cost-Effectiveness Studies**

A final data point is the cost-effectiveness of online learning. Many educators or stakeholders assume that the costs of education or training can be reduced through implementing online instruction. Cost savings typically occur when the cost of delivery and maintenance of education /training have been reduced, when content that otherwise might not have been delivered is (e.g., reaching out-of-state students), or when there is a savings due to efficiency in time spent learning the information. Cost savings can be associated and derived from reduction in travel and lost time on the job, shortened training time, as well as from improved performance on the job

and improved customer relations (Davidove, 2002; Ekeles, Phillips, & Phillips, 2017). Return on investments (ROI) and cost savings are usually reserved for business-oriented environments and are not well documented within educational settings; however, that may be changing (Phillips, Phillips, & Nicholas, 2018).

Several approaches for examining costs of online education have been employed (Jung & Lee, 2012). Cukier (1997) identified four approaches: a value-based approach, a mathematical modeling approach, a comparative approach, and a ROI approach. Jung and Lee (2013) propose an integrated approach for cost–benefit analysis of online instruction, incorporating all four of Cukier’s approaches. This integrated approach also includes looking at the value added in terms of improving the quality of students’ learning and increasing access in addition to costs. Some of the data associated with costs and benefits may be difficult to identify or gather (Phillips & Phillips, 2007).

### ***Benefits of Cost-Effectiveness Studies***

Many organizations are concerned with identifying effective learning performance while providing a savings in time (efficiency) or in cost (effectiveness). Conducting cost–benefit analysis, using various approaches, provides these data.

### ***Drawbacks of Cost-Effectiveness Studies***

It can be difficult to document whether costs savings are a direct result of implementing online instruction. Up-to-date records may not be kept and changes in learning performance and attitudes may be too subtle to detect, which make analyzing costs and benefits of online instruction difficult. Other factors, such as financial modeling, may contribute to the gains and/or losses.

### **Summary**

In this appendix, we have provided an overview of the methods and tools for use in the analysis and evaluation stages of WBID. However, this general discussion does not provide enough detail to actually plan, develop, and conduct these approaches. We suggest that readers consult additional resources on research and evaluation design and methodology, some suggestions are as follows:

Denzin, N. K., & Lincoln, Y. S. (Eds.). (2011). *The Sage handbook of qualitative research*. Thousand Oaks, CA: Sage.

Fitzpatrick, J. L., Sanders, J. R., & Worthen, B. R. (2011). *Program evaluation: Alternative approaches and practical guidelines* (4th ed.). Upper Saddle, River, NJ: Pearson.

- Johnson, B. & Christenson, L. (2016). *Educational research: Quantitative, qualitative, and mixed approaches* (6th ed.). Thousand Oaks, CA: Sage.
- Joint Committee on Standards for Educational Evaluation (2011). Webpage. Retrieved from: <http://www.jcsee.org/program-evaluation-standards-statements>.
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- Boulmetis, J., & Dutwin, P. (2014). *The ABCs of evaluation: Timeless techniques for program and project managers*. San Francisco, CA: Jossey-Bass.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.
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- Miller, M. D., Linn, R. L., & Gronlund, N. E. (2013). *Measurement and assessment in teaching* (11th ed.). Boston, MA: Pearson Education.
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## Appendix B: Quality Online Instruction: Standards, Competencies, and Codes of Ethics

Standards, competencies, and ethical practices serve as tools that help define what quality online instruction looks like and dictate the skills that designers need to develop quality online instruction. These tools provide a set of quality assurance frameworks that can also be used to evaluate online instruction. These frameworks can be used to establish rubrics and checklists to facilitate the design, development, implementation, and evaluation of online instruction. In this Appendix, we briefly address how standards, competencies, and ethics inform ways that online educators create high-quality courses and learning environments.

### Standards

Multiple standards are available that can be used to frame design and delivery of online courses and associated instructional systems. Standards set expectations for the online learning environment and identify roles and responsibilities of instructors and learners. Two general levels of standards guide the designer. At the macro level, standards are used to inform the overall learning environment and relate to systems and program-level requirements. Attention turns to the course at the micro level.

The Online Learning Consortium (OLC) includes 5 pillars in their Quality Framework to provide a framework for designing high-quality online instruction: Learning Effectiveness, Scale, Access, Faculty Satisfaction, and Student Satisfaction. Within these pillars are descriptors and criteria that can be used to provide insight and expectation into the online instruction decision-making process. The OLC Quality Framework provides guidance for both macro- and micro-level systems.

Standards for online learning have led organizations developing their own internal requirements for online course design and development, implementation, and delivery. These standards set expectations and goals for the online environment. From illustrating instructional design strategies to identifying influencing quality

factors standards facilitate creation of high-quality and effective online learning environments that promote learner performance.

Designers are encouraged to review the design standards to develop a personal framework for designing, developing, and evaluating online instruction. As part of an organization, careful review of in-place standards ensures alignment to goals and expectations.

Standards directly related to online learning include (remember that URL may change – use your favorite search engine to find updated resources:

- National Standards for Quality Online Courses
  - <https://www.inacol.org/resource/inacol-national-standards-for-quality-online-courses-v2/>
- Online Learning Consortium
  - <https://onlinelearningconsortium.org/>
- Quality Framework
  - <https://onlinelearningconsortium.org/about/quality-framework-five-pillars/>
- Quality Matters™ (2003-2006; public domain)
  - [http://dspace.nelson.usf.edu/xmlui/bitstream/handle/10806/172/QM%20Rubric%20\(2003-2005\).pdf?sequence=4](http://dspace.nelson.usf.edu/xmlui/bitstream/handle/10806/172/QM%20Rubric%20(2003-2005).pdf?sequence=4)
- Quality Matters™ (2014)
  - [https://luonline.lamar.edu/\\_files/documents/luonline/qm-standards-2014-1.pdf](https://luonline.lamar.edu/_files/documents/luonline/qm-standards-2014-1.pdf)
- Quality Online Learning and Teaching
  - <http://courseredesign.csuprojects.org/wp/qualityassurance/>
- Quality Standards for Online Learning
  - [http://www.apu.edu/live\\_data/files/334/online\\_learning\\_standards.pdf](http://www.apu.edu/live_data/files/334/online_learning_standards.pdf)
- Rubric for Online Instruction
  - <https://www.csuchico.edu/eoi/>
- Standards for Quality Online Courses: SREB Educational Technology Cooperative
  - [http://publications.sreb.org/2006/06T05\\_Standards\\_quality\\_online\\_courses.pdf](http://publications.sreb.org/2006/06T05_Standards_quality_online_courses.pdf)

## Professional Competencies

Another aspect of designing and developing high-quality online instruction relates to the skills and expertise of the individual designer. Organizations such as Association for Educational Communications and Technology, International Society for Performance Improvement, and International Board of Standards for Training, Performance and Instruction, have identified professional competencies to help guide and improve the practice of those involved with online instruction. These groups have established knowledge, skills, and abilities standards that instructional designers should possess to be effective professionals. Strong skills enable designers to put those skills into action as they create online instruction.

- AECT
  - [https://c.ymcdn.com/sites/aeect.site-ym.com/resource/resmgr/AECT\\_Documents/AECTstandards2012.pdf](https://c.ymcdn.com/sites/aeect.site-ym.com/resource/resmgr/AECT_Documents/AECTstandards2012.pdf)
- ISPI
  - [http://www.ispi.org/ISPI/Credentials/CRT\\_Cert/CPT\\_Standards.aspx](http://www.ispi.org/ISPI/Credentials/CRT_Cert/CPT_Standards.aspx)
- ibstpi
  - <http://ibstpi.org/downloads/instructional-designer-competencies/>

## Codes of Ethics

Codes of ethics shape professional practice of instructional design professionals. As part of the commitment to ensure high-quality professional content, designers, promise to take actions that support their learners, clients, employers, and the professional community. Ethical considerations can range from who is the actual client to the identification of the outcomes to the use of resources and activities in the online instruction. Note: IBSTPI's codes of ethics is included within their competencies.

- AECT
  - [http://aeect.site-ym.com/members/group\\_content\\_view.asp?group=91131&id=309963](http://aeect.site-ym.com/members/group_content_view.asp?group=91131&id=309963)
- ISPI
  - [http://www.ispi.org/ISPI/Credentials/ISPI\\_Code\\_of\\_Ethics.aspx](http://www.ispi.org/ISPI/Credentials/ISPI_Code_of_Ethics.aspx)
- ibstpi
  - <http://ibstpi.org/downloads/instructional-designer-competencies/>

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