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AUTHOR Dirks, Matthew
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ABSTRACT

Some of the major research in the area of assessment, concentrating on distance learning, is reviewed, and a strategy that can be used as a guideline for assessment of distance learning, and particularly World Wide Web-based courses, is introduced. A review of assessment strategies confirms that a balance between knowledge acquisition and conceptual change tools will offer the greatest learning potential. One of the most difficult parts of developing an assessment strategy is determining the value of each assessment and how each assessment should influence the final grade. In the course of conducting research on how to do assessment in distance learning, eight general areas of concern emerged. These were turned into a strategy, called "C.H.A.R.I.O.T.S.," that can be used as a guide for developing an assessment procedure. The C.H.A.R.I.O.T.S. mnemonic represents the components of the general strategy: (1) Constraints; (2) Having multiple assessments; (3) Audience; (4) Reporting; (5) Inquiring; (6) Objectives; (7) Types of assessment; and (8) Self-evaluation of the assessment strategy. The Constraints step requires the educator to take into account all the restraints of the distance learning system, while having multiple assessments allows the educator to approach assessment in different ways for different purposes. Audience analysis is a critical part of instructional design, adult learning theory, and pedagogy. Reporting learning progress, which can be seen as formative or summative feedback, is a way of responding to the audience. Instructors should inquire about assessment techniques that have worked in the past. Defining objectives and fitting the types of assessment available to them are essential, as is the self-evaluation process to consider what is learned from the assessment and whether or not it is appropriate. One appendix lists components of a final grade table, and the other shows an objective verification table. (Contains 4 tables and 19 references.) (SLD)

Developing an Appropriate Assessment Strategy: Research and Guidance for Practice

by

Matthew Dirks

Paper available on-line:

http://star.ucc.nau.edu/~nauweb97/papers/dirks.html

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Developing an appropriate assessment strategy for a web based course can be complicated task. While conducting research on how to do assessment in distance learning, eight general areas of concern emerged from the literature. These concerns were turned into a strategy, called C.H.A.R.I.O.T.S., and can be used as guidelines for developing an assessment procedure. This paper has two specific goals: 1) present some of the major research in the area of assessment and 2) translate this research into a format that is useable by a classroom teacher. These two goals are represented by the two parts of the paper.

Part I: Research on Assessment

Assessment for distance learning has not been thoroughly researched. Many of the principles of classroom assessment apply in a distance learning context, but there are some key differences that need to be taken into account (e.g. feedback, security, and assessment tools). The following literature review was collected while trying to determine how to conduct research in distance learning assessment. It is presented here to support the guidelines presented in the second half of the paper.

Choosing an assessment strategy can be one of the most difficult parts of instruction. The assessment strategy chosen by an instructor reflects their values and identifies what is important for the learner (Taylor and Nolen, 1996). In order to explore how an assessment strategy can be used to maximize learning: the nature of assessment, the reasons behind multiple assessment methods, and using multiple assessment techniques will be discussed.

I. What is Assessment?

Assessment is defined as a direct measure of what has been learned as a result of instruction on specific objectives (Gagne, Briggs, & Wager, 1988). Educational assessment is an omnibus term which includes all the processes and products that describe the nature and extent of learning, its degree of correspondence with the aims and objectives of teaching and its relationship with the environments which are designed to facilitate learning (Satterly, 1989, p 3). This description of the students learning is then used for several purposes. Most authors cited in Guskey (1996) identify five major categories of uses for assessments:

- communicate the achievement status of student
- provide self-evaluation information to the learner
- student placement for educational paths or programs
- motivate the learner
- evaluate the effectiveness of instructional programs.

Assessments are made up of two components: measurements and evaluations. Measurement is a systematic process that is concerned with developing a quantitative and qualitative description of student performance or behavior (Erickson & Wentling, 1978). Many times this is not enough information to communicate how the student is performing, some form of evaluation of the measurement needs to be made. Evaluation is concerned with judging the adequacy or worth of a particular performance or sample of students' knowledge, understanding, skills or feelings (Erickson, 1978, p 3). Although evaluations in education do not necessarily involve measurements, the usual purpose of measurement in education is to provide data which may be used in the evaluative process (Lindeman, 1967).

Assessment is a complex concept and is easier to understand once the key components are discussed. Rowntree (1987) identified five dimensions of assessments

based on five questions that need to addressed when preparing assessments. The questions are:

> Why assess? Deciding why assessment is to be carried out; what effects or outcomes it is expected to produce.
>
> What to assess? Deciding, realizing or otherwise coming to an awareness of what one is looking for, or remarking upon, in the people one is assessing.
>
> How to assess? Selecting, from among all the means we have at our disposal for learning about people, those we regard as being most truthful and fair for various sorts of valued knowledge.
>
> How to interpret? Making sense of the outcomes of whatever observations or measurements or impressions we gather through whatever means we employ; explaining, appreciating, and attaching meaning to the raw 'events' of assessment.
>
> How to respond? Finding appropriate ways of expressing our response to whatever has been assessed and of communicating it to the person concerned (and other people) (Rowntree 1987, p 11).

The first two questions: "Why assess?" and "What to assess?" have been addressed by the principles of instructional design. In education, most assessments are considered objective-referenced assessments in that student assessments directly measure the human performance described in the objectives for the course (Gagne, 1988). This is why instructional design models call for performance objectives to be written before determining a way to assess what has been learned. The importance of assessment is also noted by the fact that in most instructional design models the assessments are considered before the materials are developed (e.g.: Dick & Carey, 1985).

The next three questions: "How to assess?", "How to interpret?" and "How to respond?" are directly influenced by the instructors teaching strategy. These issues can

be more clearly addressed if time is taken to look at some of the major reasons so many different types of assessment exist.

II. Why are There Multiple Assessment Techniques?

In the literature, there are four major reasons why there are multiple assessment techniques: the type of skill being assessed, the limitations with assessments, the nature of reporting and the reliability and validity of the assessment tool. Each of these will be addressed separately.

A. Type of Skill

The research in performance based objectives has illustrated that there are different types of learning outcomes. Bloom's Taxonomy of Educational Objectives (1956) shows three taxonomies: cognitive, affective, and psychomotor. In the cognitive domain there are six main classes: knowledge, comprehension, application, analysis, synthesis and evaluation. Similarly, Gagne's Conditions of Learning (1985) shows five main categories of human performance: intellectual skills, verbal information, cognitive strategies, motor skills and attitudes. Intellectual skills are further broken down into discrimination, concrete concept, defined concept, rule, and higher-order rules. Regardless of the system used, there are multiple learning outcomes and for each of these outcomes different assessment strategies may be appropriate. Very little has been written about which assessment is most appropriate for the different learning outcomes, but Satterly (1989) gives a few examples of appropriate selection:

- If your aim is to encourage children to learn how to organize their own ideas and to express them effectively, then essays as part of continuous assessment are indicated.
- If the aim is to encourage the development of problem solving skills than process assessment is required.

- If major attention is paid to building up children's background of knowledge, this would best be accomplished by formal objective tests rather than by ad hoc informal testing (p 62).

When choosing an assessment method, it is important to keep in mind the learning objectives and choose an assessment that is concurrent with your learning goal (Satterly, 1989).

B. Limitations of Assessment

Several limitations exist among all forms of assessment. Guskey's (1996) review of the literature found, among other things, that 1) no one method of grading and reporting serves all purposes well, and 2) grading and reporting will always involve some degree of subjectivity. Similarly Keeves (1994) indicates that measurement is beset with problems of error and every assessment needs to be analyzed for what errors it may have. Because of the errors associated with all forms of assessment, multiple forms of assessment are used to reduce the error and provide more opportunities for the learner to demonstrate mastery of the objectives.

C. Nature of Reporting

Assessment is used to communicate student progress on learning, but the current reporting techniques usually require all assessments to be summed up in one grade. Bailey and McTighe (1996) found that grades often reflect a combination of achievement, progress, and other factors (e.g., effort, behavior, progress, completing assignments on time). This is a problem because letter- or number-grade report cards are the most widely used reporting systems. Experts express concern that this tendency to collapse several independent elements into a single grade may blur its meaning (Bailey, 1996). Guskey (1996) found that most instructors base their grading and reporting on product criteria, process criteria, progress criteria or some combination of these three types. Because

these different criteria change what a grade could mean, measurement specialists recommend the use of product criteria exclusively for determining a grade (Guskey, 1996).

D. Validity and Reliability

An important consideration when deciding how to interpret an assessment is how valid and reliable that assessment is. Validity and reliability are not things that can be proven, they are constructs that can be supported with evidence. Also, a given assessment tool cannot be said to be valid, because it is the interpretation that is valid or invalid for some specified purpose (Satterly, 1989). Validity of an assessment is defined by Henning-Stout (1994) as the extent to which the assessment procedure measures what it is intended to measure. Gagne (1988) identifies the questions that should be asked when determining if an assessment is appropriate: "Does the performance in fact accurately reflect the objective?" and "Has the performance occurred under conditions that make the observation free from distortion (p 190)?" The types of evidence for validity include content related, criterion-related and construct related.

Reliability of an assessment procedure is evident in how consistently that procedure produces the same information (Henning-Stout, 1994). Gagne (1988) asks, "How does the instructor know the student did not do the required performance by chance or by guessing?" Rowntree (1987) looks at reliability a little differently and asks, "Would other assessors agree with my interpretation of the student's behavior and would I myself interpret his behavior in such a way if I saw it again (p 190)?"

III. Using Multiple Assessment Techniques

Determining which assessments to use requires an analysis of what skills are being assessed, the problems with the assessment tools, the restrictions associated with the common methods of reporting, and the accuracy of our interpretation. These issues

need to be considered when determining "How to assess?", "How to interpret?", and "How to respond?" The choice of assessment techniques should always be tied to the objectives and require student performances which lead to the desired learning outcomes.

A. Teachers Orientation to Assessment

The types of assessment tools used have an impact on what students learn. Martin and Ramsden (1992, p 148) suggest that differences in how students learn subject matter can be related to how their teachers think about it and how they expect students to learn it. The assessment strategies one adopts are often a reflection of one's orientation to learning and teaching. The teacher's orientation to learning indicates to students what performance is important and changes their learning strategies to obtain the highest possible scores (Taylor, 1996). The type of assessment indicates if memorizing facts, reproducing material presented in lectures, showing evidence of original thinking, developing arguments, applying principles or developing and perhaps changing their own conceptions is important (Donnan, 1996). The teacher's choice of one assessment tool over another reveals as much about the 'value-laden interests' of the teacher as it does about the subject of their assessments (Taylor, 1996, p 4).

B. Outcomes of Assessment Tools

Imposing any dichotomy over the tools of assessment and their uses would be inaccurate. Analyzing an assessment from a teaching-centered versus a learner-centered point of view is very difficult because assessment tools can be used by both orientations to achieve different goals. It is more efficient to address which tools are most commonly used for knowledge acquisition and retention, the tools that are more commonly used for understanding and conceptual change, and tools that can be used for either goal.

1) Knowledge Acquisition and Retention

The most common orientation towards assessment is to determine if knowledge has been acquired and retained. This orientation is illustrated by the Dick and Carey model of instructional design which calls for the development of criterion referenced **test** items (Dick, 1985). The test is the default assessment method in the model. According to Donnan (1996) this orientation promotes the following characteristics in learners:

- adds to store of facts
- builds repertoire of skills and procedures
- breaks down problems into sub-units
- works methodically and logically
- uses memorization skills
- makes links within units of knowledge
- uses systematic trial and error in problem solving

2) Understanding and Conceptual Change

The other common orientation to learning is in terms of understanding and conceptual change (Donnan, 1996). The more common assessments for this orientation include papers, essays, journals, projects or a thesis. According to Atkins (1993), learners exposed to this orientation exhibit the following characteristics:

- a mastery of principles and concepts including the ability to apply them to an understanding of the 'real world'
- an understanding of the methods and tests for truth which a discipline uses
- an engagement with the societal contexts of the discipline, including associated theoretical and moral issues.

A similar division can be drawn when looking at Gagne's nine types of learning outcomes. Knowledge acquisition and retention strategies are concerned with memorizing information. This would correspond to the learned capability of

discrimination, concrete concepts, defined concept and verbal information (Gagne, 1988). Gagne recommends specific verbs; like discriminates, identifies, classifies, and states, when identifying these kinds of learning objectives. These are different learning skills than those that require the student to apply what has been learned. Learning outcomes like rule use, higher-order rule use, cognitive strategies, motor skills and attitude changes require learning beyond that of memorizing facts. Similarly, the ways these learning outcomes are identified in an objective is different. The capability verbs used in these objectives are: demonstrates, generates, adopts, executes, and chooses (Gagne, 1988). Interestingly, similar to the instructional strategies discussed below, the capabilities seem to be hierarchically linked. It is much easier for a learner to demonstrate rule use if they are able to verbally state what the rule is.

3) Knowledge Acquisition and Understanding

The two orientations should not be set up as dichotomies. Many times an instructor may use knowledge and acquisition assessment strategies to provide a foundation for the learners and then apply understanding and conceptual change strategies to allow the learners to use their new knowledge. These strategies can be taking place side by side in the same class, or even within the same assessment. An instructor, in an essay exam, may ask for a description of a theory (knowledge acquisition) and a unique application of that theory (understanding).

It is also important to note that different assessment strategies are not automatically aligned with one orientation towards teaching. A term paper could be used to assess knowledge and acquisition or provide an opportunity to apply understand and conceptual change. Thesis, journals, and projects are more common assessment strategies for assessing understanding and conceptual change, but that does not mean their use is limited to this context. Assessments like short answer tests, multiple choice

tests, essay exams, papers, and projects could be used by instructors utilizing either orientation or a combination of both.

C. Providing Feedback and Grades

Feedback is the mechanism used to inform the learner about their learning progress. It has to common forms: formative and summative. Many times feedback contains grading information. This information lets the student know how they did on the assignment and can be used to determine the final grade. Learning occurs perfectly well without grading, but feedback is essential.

1) Formative Feedback

Formative feedback usually provides more information about how the learner is progressing. Formative feedback includes grades, but it goes beyond grades with comments on written papers, brief conferences, or critiques. It provides the learner and the instructor with information about how the teaching and learning process is going. Lowman (1984) offered a few suggestions which are relevant when considering formative feedback:

1. Keep students informed throughout the term about how they are doing in regard to grading categories.
2. Be generous when averaging scores of students who have made improvements over the term. A low score on the first test will be very discouraging if there is no further opportunity for success in the course.
3. If posting grades is common, post them in a way that protects students' identities.
4. Treat grades seriously, but without undue anxiety.

2) Summative Feedback and Grading

Summative feedback is characterized by the final grade. It is a final report on the learning outcomes. When thinking about grading Guskey (1996) recommends the following considerations:

1. Begin with a clear statement of purpose. A statement of purpose should address why grading or reporting is done, for whom the information is intended, and what the desired results are.
2. Provide accurate and understandable descriptions of student learning.
3. Use grading and reporting methods to enhance, not hinder, teaching and learning.

One of the more difficult parts of grading is ensuring that grades are uniform, accurate, and understandable. Wright (1994) offers the following suggestions:

1. Grades should conform to the practice in the department and institution in which the grading occurs.
2. Grading components should yield accurate information.
3. Grading plans must be communicated to the class at the beginning of each term.
4. Grading plans stated at the beginning of the course should not be changed without thoughtful consideration and a complete explanation to the students.
5. The number of components of elements used for assigning course grades should be large enough to enhance the accuracy of grading.

D. Combining Assessments for Grading Purposes

A logical consequence of using multiple assessment strategies is that the value of the assessments will need to be combined to inform the learner of their progress. Wright (1994) sites six principles for combining scores:

1. The use of several different kinds of indicators of achievement is better than one (e.g., papers, tests, and journals).
2. The most reliable component should be given greatest weight.
3. Collectively, components should measure all important objectives of the course.
4. Two components covering unique objectives should have greater combined weight than two components measuring the same objective.
5. The most important objectives should be measured with more components.
6. The component with greatest variability will influence the final score to a greater degree than components with less variability. Efficient means of proper weighting can be done using computations of standard scores such as *t*-scores.

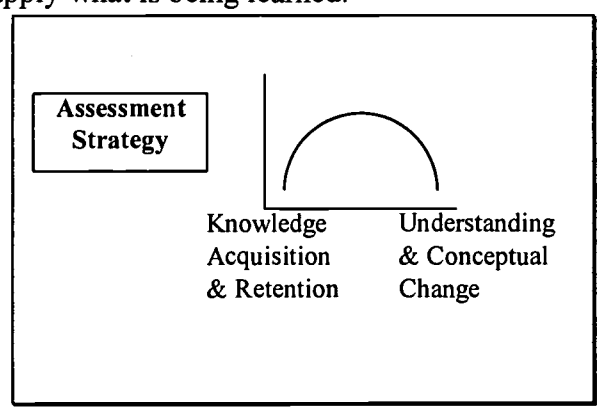
Regardless of the way the assessments are combined, the content of the grade needs to reflect the learning objectives. Wright (1994) quotes Eble and Frisbie as suggesting that factors such as class attendance, participation, neatness, personality style, motivation or other skills cannot be considered appropriate components of the grade unless they are directly related to explicitly stated learning objectives. Neatness may be an appropriate component of a grade being given in a business class where one of the objectives was to have students present themselves professionally.

It is also important to keep in mind that grades have more value as a motivator than as punishment. Consider how a low grade on the first test could affect learning. A low test score could mean that the learn is doomed to a low grade in the course and significantly impact their effort. Because of this Guskey (1996) indicates that averaging of test grades should be considered inadequate and inappropriate. The most accurate information and the most current information should be given the greatest weight. Stiggins (1994) claims that if students demonstrate that past assessment information no

longer accurately reflects their learning, than that information must be dropped in favor of the most current information. Emphasis on past on past assessment data inaccurately reflects student learning.

E. Optimizing Learning

Assessment strategies need to show balance. An inverted U curve could be used to illustrate this point. On the horizontal axis there is a continuum of assessment strategies from strict knowledge acquisition to strict assessment of understanding and conceptual change. Student performance is going to be at its' highest point when a combination of assessment tools are used. For optimal performance, neither orientation is excessively represented. Too much emphasis on knowledge acquisition and the students will cram for exams and not be able to apply the knowledge. Too much assessment of conceptual change and the learners will be writing opinion essays without knowing the theory they are discussing. Certain classes should have more emphasis on certain assessment techniques, but in general the extremes should be avoided to allow the learner to know and apply what is being learned.



IV. Conclusion

Assessment strategies reflect the teacher's priorities in teaching and affect what the students learn. A balance between knowledge acquisition and conceptual change tools will offer the greatest learning potential. Assessment tools can be used for several

different purposes, but they loose their meaning if they are not assessing the learning objectives. On of the most difficult parts of developing an assessment strategy is determining the value of each assessment and how each assessment should influence the final grade.

Guidelines for Developing an Assessment Strategy

Developing an appropriate assessment strategy for a web based course can be complicated task. While conducting research on how to do assessment in distance learning, eight general areas of concern emerged from the literature. These concerns were turned into a strategy, called C.H.A.R.I.O.T.S., and can be used as guidelines for developing an assessment procedure. This paper was written to bring together several different researchers ideas on assessment and present it in such a way that teachers would be able to apply it in their planning processes. This is a preliminary compilation of the research in this area. After the guidelines are tested a more useful set of worksheets or planning tools can be developed to assist an instructor in developing an assessment strategy.

I. C.H.A.R.I.O.T.S.

This is a brief overview of the general strategy. The mnemonic for this strategy is C.H.A.R.I.O.T.S. It stands for Constraints, Having multiple assessments, Audience, Reporting, Inquiring, Objectives, Types of assessment and Self evaluation of the assessment strategy. Each component of the strategy will be discussed briefly to provide an outline of some of the major concerns facing an instructor developing an assessment strategy.

A. Constraints

This step requires the educator to take into account all of the restraints of the system. Issues concerning the amount of time for assessment, the number of students, administration of the assessment, technology limitations, security and students with disabilities need to be taken into consideration. This is not an area to identify all the possible excuses to not do thorough assessments. It is an opportunity to identify what kind of a system you are working in and what is practical within those limitations. Constraints are usually identified by identifying the assessment strategy and then asking questions about what might interfere with the success of the assessment.

Example

The Internet offers new opportunities for assessment, but there are still constraints that need to be considered. When allowing students to submit an essay over the Internet constraints that should be considered, among others, are:

- How to provide feedback on the assignment?
- How to ensure that each learner did their own work?
- How to enforce submission deadlines?
- Determine if feedback about the receipt of the essay needs to be given?
- Is there a way to make the essays available to enhance student learning?
- Are there any network issues that need to be resolved?
- Does the instructor need a separate e-mail address for homework submissions?

B. Having Multiple Assessments

Guskey (1996) indicates that all forms of assessments have problems and no assessment technique will serve all of your needs. For these reasons, and others, it is recommended that multiple assessment techniques are used. Please refer to the combing assessments for grading purposes section of this paper, or the section on using multiple

assessments, for further information. The instructor needs to know how they are going to use the information they are collecting to inform the learner of their learning progress.

Example

The table in Appendix A will help you identify what assessment strategies you are using and how much weight you are giving them. The table was originally designed to help evaluate assessment strategies, but it can also be used for planning. A brief example would look like this:

Assessment Tool	Weight	Frequency / Length	Type of Feedback
1. Exams	40	2 exams / 100 ? each	Grade & what was missed
2. Paper	20	1 paper / 10 pages	Score sheet, comments, conference if needed
3. Homework	20	10 assignments	Comments and class discussion
4. Journal	20	1 journal / at least 10 pages	Comments and discussion
5.			
6.			

C. Audience

Audience analysis is a critical part of instructional design, adult learning theory, and pedagogy. In this stage it is appropriate to consider who your learners are, how the assessments will affect them, and how the learner can become more involved and self directed in the learning process. It is also important to consider what kind of feedback will be useful to the learner and how to communicate that information to them. Writing down who you believe the learners to be is helpful in identifying your biases and improving the delivery of instruction.

Example

The audience for my course on developing multimedia for instruction will probably have the following characteristics:

- The learners will be adults
- Most of the learners will be moving into the field of education
- There will be varying levels of computer knowledge and not much can be assumed
- Experienced learners will need to be challenged beyond the course material
- Some of the learners will have relevant experience in the field

This information can then be used to determine appropriate content. From this short list it is apparent that educational multimedia examples should be used and adult learning strategies employed. This will need to be revised as you come to know your students.

D. Reporting

Reporting learning progress can take on many forms, but it can be analyzed as formative or summative feedback. Formative feedback goes beyond grades and includes comments on written papers, brief conferences, or critiques (Wright, 1994). For reporting learning progress, on regular assessments, it is important to think about what you will want to communicate to the student, how the student will use the feedback, and how you will get that feedback to them. Formative feedback should be:

- directed to the individual learner
- identify strengths and weaknesses
- focus on improvement and quality of work produced
- not be unnecessarily negative.

Summative feedback is used when considering the final grade. You need to consider how the assessments are going to be reported, how will that information be used,

and is the right kind of information being collected for grading purposes? Please refer to the section of this paper on combining assessments for grading purposes. The table in Appendix A also helps you identify what types of feedback you are going to provide.

E. Inquire

Instructors should inquire with other distance learning educators to learn about what has worked in the past. There is a need in the distance learning field to reduce the "rugged individualism" and increasing cooperative working environment so that each new instructor doesn't need to make the same old mistakes. Developing a community of learners, or a central resource distribution center, is helpful in facilitating this process. This doesn't mean that all of the assessments should be the same, but we should not limit ourselves to what we know, are comfortable with, or our web masters can create for us.

F. Objectives

The objectives must be written before determining the assessment strategy. There are several questions that need to be asked concerning the assessment strategy based on the objectives: are the assessments appropriate for the desired learning outcomes, will it allow for **valid** and **reliable** interpretations, and how can the objectives be measured based on the constraints of the system? Objectives also provide guidance on what to include in the final grade. This is useful in determining whether or not attendance, neatness, or punctuality should be considered. Completing the table in Appendix B will help you identify whether or not your objectives are being assessed.

G. Types of Assessment

Assessment choices will be better if instructors are aware of what assessment tools are available and the pro's and con's of each in a web based environment. We need to develop a listing of the tools of the trade, their advantages and disadvantages, and how

difficult they are to implement. The most current list I have found can be reviewed at: http://www.csu.edu.au/oli/oli-rd/occpap19/donnan.htm

This table can be expanded upon and made more specific for distance learning.

H. Self Evaluation of Assessment Strategy

After developing an assessment strategy, for the classroom or distance learning, it is important to consider what has been assessed and whether or not that is appropriate. The tables in Appendix A and Appendix B where designed to help you make this kind of evaluation.

It is very difficult to try and plan for all the circumstances that may influence your grading practices. It is important that your grades are fair, accurate, conform to the grading practices in the school where the grading occurs, and are meaningful in communicating to the learner their progress. Also once an assessment procedure is identified it should be communicated to the students and not changed unless it is absolutely necessary.

II. Conclusion

The goal of this presentation is to outline guidelines for determining an appropriate assessment strategy. The audience will be provided with an opportunity to see the strategy applied to a web based course, make suggestions, and question the researcher. It should be a learning experience for all involved.

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Appendix A: Components of a Final Grade Table

Assessment Tool	Weight	Frequency/Lengths	Type of Feedback
1.			
2.			
3.			
4.			
5.			
6.			

1. What happens if the learner fails the first test? Is there any way for them to still achieve a high grade?

2. How will late papers and missed assignments be handled?

3. Who is the final grade being reported to and why?

4. How will the grade information be used?

Appendix B: Objective Verification Table

Purpose of Grading:

Objective	Assessment Strategy	Recall or Recognition	Comprehension or Application	Critical Thinking or Problem Solving
1.	_____ _____ _____ _____	❑ ❑ ❑	❑ ❑ ❑	❑ ❑ ❑
2.	_____ _____ _____ _____	❑ ❑ ❑	❑ ❑ ❑	❑ ❑ ❑
3.	_____ _____ _____ _____	❑ ❑ ❑	❑ ❑ ❑	❑ ❑ ❑
4.	_____ _____ _____ _____	❑ ❑ ❑	❑ ❑ ❑	❑ ❑ ❑

Authors Note

Matthew Dirks is a doctoral candidate in the Instructional Systems program at Florida State University.

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Correspondence concerning this article should be directed to the author. My current e-mail address is: med4333@garnet.acns.fsu.edu.

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Organization/Address:	Telephone: 801 802 7257 FAX: 801 802 7257
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