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Abstract: Current research at all levels of schooling emphasizes the importance of effective reading comprehension as well as the challenges instructors face in teaching it. In 2007, the Texas Higher Education Coordinating Board (THECB) awarded The University of Texas at El Paso (UTEP) a grant to develop 14 online professional development modules. These modules provide reading comprehension strategies to college-level faculty who are teaching entry-level college courses across disciplines. The modules were designed to maximize interaction and provide “take aways” for participants.

Background

Current research at all levels of schooling emphasizes the importance of effective reading comprehension skills as well as the challenges instructors face in teaching it. Hilden and Pressley (in press) indicated that,

to be effective, strategies for teaching reading comprehension must be carefully designed. They cite several reports that suggest teaching reading comprehension at the elementary school level is so challenging for teachers that they are often unable to teach effective strategies (Klingner, Vaughn, Arguelles, Hughes, & Leftwich, 2004; Mason, 2004). Others found that reading comprehension strategies were simply not taught extensively in public schools (Pressley, Wharton-McDonald, Hampston, & Echevarria, 1998). Ray and Belden (2007) indicated that while some entering college students have the necessary reading vocabulary, they often struggle to identify and organize concepts, specify relationships among concepts, or elaborate on concepts presented in a text. Consequently, many students arrive in college classrooms with deficiencies in reading comprehension abilities. This is a frustrating situation for faculty with limited experience and training in helping students overcome these reading comprehension deficiencies in order to master the material and succeed in the course.

The University of Texas at El Paso (UTEP) was awarded a faculty development grant by the Texas Higher Education Coordinating Board to create 14 online modules. These self-paced and independent modules help faculty untrained in reading comprehension to adopt strategies for improved reading comprehension in any entry-level college course.

Design Theory

Pressley and colleagues (Hilden & Pressley; in press) indicated that effective reading comprehension instruction involves the progressive disclosure and modeling of increasingly complex strategies followed by reminders to use the strategies as well as performance-related feedback. Our modules model this process by providing a sequence of learning activities that build on each other and progressively disclose the main concept. In this manner, faculty experience an exemplar methodology of teaching a specific reading comprehension concept that they can easily adapt for their classes. Several studies have shown that such strategies can produce large gains in comprehension and substantive improvements on standardized reading tests (Brown, Pressley, Van Meter, & Schuder, 1996; Collins, 1991).

The extensive review of research on teaching and learning by the National Research Council (Bransford, Brown, & Cocking, 2000) and consideration of our audience's needs and constraints influenced our learning goals for the modules. In sum, these goals are to (a) present reading comprehension experiences common to most college faculty and their students; (b) focus on a key reading comprehension strategy/concept and describe both how and why it works, and; (c) help learners develop strategies that help them take control of their learning through setting goals and monitoring their progress in achieving those goals (Bransford, Brown, & Cocking, 2000).

The modules encourage college faculty to practice using metacognitive strategies to create an internal dialogue regarding their concerns with teaching reading comprehension strategies. Through this, faculty can gain an understanding of these strategies for improving students' reading comprehension before they teach them. Based on the work by Bransford, Brown, and Cocking (2000), goal setting, questioning, and monitoring of understanding is integrated in each module. Additionally, asking learners to engage in these processes should benefit their motivation to complete the modules.

Module Design

Each module is based on Fink's (2003) strategy for developing significant learning experiences. Each module contains a brief background or introduction explaining its purpose, the learning outcomes, the learning opportunities, and assessments. The structure and strategies used within each module to ensure relevance and usability are based on cognitive psychology, educational theory, as well as the practical teaching and learning experiences of the design team.

To maintain consistency, each module follows these tightly integrated components:

1. Overview—provides a list and explanation of the goals and objectives.
2. Experiential exercise—provides a passage or classroom scenario and asks instructors to reflect on their experience with reading/understanding the passage or to consider what they would do in the classroom.
3. Introduction to the strategy—provides an overview of the strategy including why and how it works.
4. Application of strategy—provides a scenario and asks how the instructor would handle it. After they have responded, they are given a “what we suggest.”
5. Printable—provides a take-away that summarizes the main points, includes tips and strategies for going straight to the classroom, and an “is it working?” section that provides suggestions for assessing students' reading comprehension.
6. Further readings—provides articles, websites, books used in the production of the module as well as other useful sources.
7. Response—provides an area for the users to include feedback regarding the module's usefulness via a blog.

Overview of modules and learning outcomes

Learning Outcomes for Module 1: Reading Comprehension--What It Means, Why We Should Care

Faculty will experience reading comprehension frustration and become familiar with strategies to overcome it. Faculty will become aware of reasons for teaching effective reading comprehension strategies.

Faculty will be provided with a topic overview of the remaining 13 modules.

Learning Outcomes for Module 2: Understanding Purposes for Reading and the Reading Process

Faculty will recognize purpose-driven approaches to reading.
Faculty will learn about three stages of the reading process.
Faculty will learn strategies for engaging students in purpose-driven active reading. \

Learning Outcomes for Module 3: Utilizing Metacognition

Faculty will learn about metacognition as an effective reading strategy that develops awareness and control.
Faculty will learn application strategies for self-monitoring and self-correction for reading comprehension difficulties.

Learning Outcomes for Module 4: Previewing and Pre-reading

Faculty will gain an awareness of the importance of previewing exercises for reading comprehension.
Faculty will learn application strategies for linking new learning to previous knowledge.
Faculty will learn application strategies for generating focus and thereby increasing reading comprehension.

Learning Outcomes for Module 5: Differentiating Between Main Ideas and Supporting Details

Faculty will gain an awareness of reasons students encounter difficulty distinguishing main ideas.
Faculty will learn application strategies for helping students identify main ideas and supporting details for improved reading comprehension.

Learning Outcomes for Module 6: Annotating Texts and Notetaking

Faculty will develop an awareness of how annotating and taking notes can promote strong reading comprehension.
Faculty will learn application strategies for teaching annotation and notetaking to students.

Learning Outcomes for Module 7: Outlining and Graphic Organizing

Faculty will gain an awareness of how outlining and using graphic organizers to interpret and take notes increases comprehension while reading.
Faculty will learn application strategies for teaching outlining and mapping to students.

Learning Outcomes for Module 8: Vocabulary Building

Faculty will learn why vocabulary building is important to strong reading comprehension.
Faculty will learn application strategies to emphasize the importance of understanding vocabulary for good reading comprehension.

Learning Outcomes for Module 9: Using Memory Enhancement Techniques

Faculty will gain an awareness of mnemonic techniques and how they can aid reading comprehension.
Faculty will learn application strategies that can be easily employed in the classroom and individually.

Learning Outcomes for Module 10: Organizing Student Reading Groups

Faculty will gain an awareness of collaborative learning benefits and their impact on reading comprehension.
Faculty will learn application strategies for creating effective student reading groups.

Learning Outcomes for Module 11: Reading Rhetorically

Faculty will gain an awareness of basic rhetorical concepts that aid with reading comprehension.
Faculty will learn application strategies for teaching these concepts to students.

Learning Outcomes for Module 12: Reading Electronic Texts

Faculty will gain an awareness of the challenges students face when reading electronic texts.
Faculty will gain an awareness of the strategies students can employ when reading electronic, academic texts.

Learning Outcomes for Module 13: Reading Visuals

Faculty will gain an awareness of how visuals impact reading comprehension.
Faculty will learn student application strategies for reading multiple types of visuals.

Learning Outcomes for Module 14: Judging textbooks for efficient comprehension

Faculty will acquire an awareness of how textbook design can influence reading comprehension.
Faculty will acquire strategies for choosing effective textbooks

Interaction Development Theory

The paradigm shifts from behaviorism to cognitivism and now to constructivism is represented in how curriculum and instruction is designed (Cooper, 1993). The shift can be characterized beginning with the deconstruction of an objectivist tradition, where knowledge is perceived to exist independently from the learner and can therefore be disseminated as content or knowledge by a teaching figure, to constructivism, where a learner's conceptions of knowledge come from a knowledge-making process in which learners are engaged in constructing their own interpretations of knowledge from their experiences, guided by a teaching figure.

The change in the field of education from an objectivist framework for teaching and learning to a constructivist framework for learning has its roots in John Dewey, Jean Piaget, Lev Vygotsky, and to some extent, Jerome Bruner. The shift can also be seen to parallel discussions related to modernity and postmodernity. This parallel is important in that it highlights the trend away from modern notions of learning theory, notably behaviorism and cognitivism, and their objectivist transmission of knowledge philosophy (Driscoll, 1994); and a more postmodern, or constructivist philosophy, that emphasizes knowledge building and transformation from and by the learner.

While there is not currently any unifying theory on the philosophy of constructivist learning, there are some similarities between the different constructivist approaches. These similarities, within the context of factors that influence learning, are 1) authentic learning experiences are necessary for learning to occur;

2) the social environment and the level of interactivity; 3) students' preconceived notions on a particular topic guide their ability to learn new material and; 4) learning occurs through the construction of knowledge by the learner ((Pressely, Harris, & Marks, 1992; Bruning, Royce, & Dennison; 1995). This constructivist philosophy therefore changes the way in which knowledge is acquired and necessitates a change in the way instruction and curriculum is designed.

In the constructivist environment, using a model of situated cognition where knowledge is continually constructed and evolving with each new learning situation (with all situations seen as potentially new), the learner is engaged in an environment where knowledge is acquired through acculturation (Brown, Collins, & Duguid, 1989).

Development Environment

The delivery of the materials for the modules was designed in a stand-alone web based environment and sought to offer maximum learner control of the content. Palsole and Schulte (2003) demonstrated that an effective way to use stand alone multimedia was to create an educational experience that would enable the learner to interact with a narrow set of variables to construct individual knowledge. The experience model creates learner control through self-selection of modules, strategies, clips and importantly control over sharing of experiences and resources. Once the tasking is completed, the learners are taken through a process of feedback and reflection in an attempt to create cognitive linking that leads to learning and comprehension. Our development model is a loose variation of the interaction centric model (Ohl, 2001).

Technical Architecture

The architecture of the modules needed to meet accessibility standards and also ease of distribution either via a Learning Object Repository OR CD's. The final solution uses XML to manage the content instead of a database and JavaScript, XML-DOM to access and traverse through the XML. Since XML is a flexible text-based format, the modules could be packaged for distribution on CD's or any other external media as long as the directory structure was maintained across media. The second advantage of this was that because the content was now separate from interactions/animations, we could deliver the same content to two different versions of the modules, namely Flash for maximizing the interactivity and a HTML version which was now Section 508 compliant. The architecture is outlined in Figure 1.

Assessment

More than 40 faculty from various disciplines and institutions participated in the formal evaluation of these modules. In addition to online evaluation, we conducted small focus groups with members who volunteered to provide additional feedback. Feedback from the faculty developing the writing modules (feedback and discussion at team meetings) and the UTEP Instructional Support Services technical development staff (focus group) was also considered.

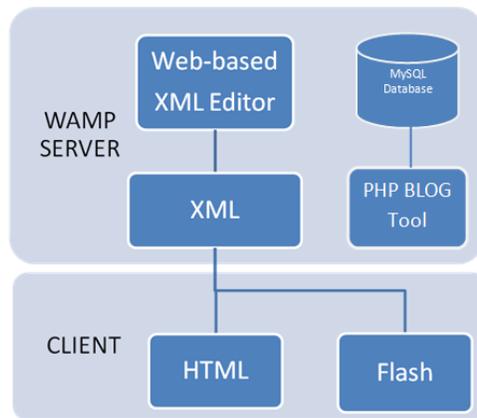


Figure 1: Module delivery architecture

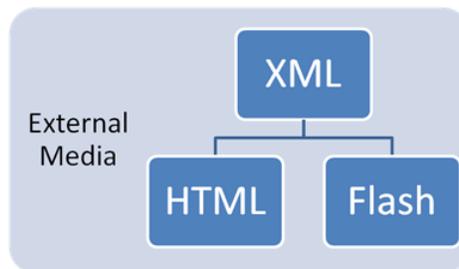


Figure 3: Architecture for external media

The review of the modules was conducted in sets of three by faculty evaluation groups from UTEP, El Paso Community College (EPCC) and local high schools. The module review consisted of administering an online survey which was taken as the reviewers went through each module. The primary evaluation questions address both the content of the modules and the underlying application of technology:

1. Are the content objectives of the online reading modules being met?

2. Is the technology user-friendly? Does it complement and/or facilitate the learning of the content?

A secondary set of questions helped us determine how useful, meaningful and user-friendly they modules were. Table 1 outlines the secondary questions within each of the primary evaluation questions.

Table 1. Evaluation Questions – Overarching and Specific

Evaluation Questions on Content	<ul style="list-style-type: none"> • Are the content objectives of the online reading modules being met? • What information presented in the module did you find especially helpful? Did you consider any material presented not clear? Not helpful? Any suggestions for improving? • Can you apply these in your classroom? Or do you need more information before you can apply? • Was the exercise aligned well with the topic being presented in the module? Could you tailor it for your students? • Is the technology user-friendly? Does it complement and/or facilitate the learning of the content?
Evaluation Questions on Technology	<ul style="list-style-type: none"> • Was the module user-friendly? Which features were most user-friendly? • Were you able to navigate easily through the module? • Did you experience any difficulties with moving through the module? Where? Any suggestions for improving?

Table 2 presents the questions included in the online survey to create a comprehensive review of the modules by the reviewers. Reviewers were asked to respond on a five-point scale.

Table 2. Items in Online Survey for Module Review

1. Information presented in module was helpful?	14. Technical organization of module is user-friendly?
2. Information presented was clear?	15. Which features are most user-friendly? Suggestions?
3. Material presented was not clear or not helpful? Additional suggestions?	16. Able to navigate easily through the module?
4. Information could be applied in my classroom?	17. Was module challenging at times? Suggestions?
5. Enough information was presented so I can apply in my classroom?	18. Did not experience any difficulties
6. What works for you? Do you need more	

<p>information before you can apply?</p> <p>7. Exercise is aligned with topic in the module?</p> <p>8. Exercise is useful?</p> <p>9. Exercise could be tailored for my classroom?</p> <p>10. Would consider incorporating exercise in my classroom? Additional suggestions?</p> <p>11. Printable take-away materials are helpful?</p> <p>12. Suggestions for assessing reading comprehension are helpful? Additional suggestions?</p> <p>13. Further Readings are helpful? Additional suggestions?</p>	<p>moving through the module?</p> <p>19. What worked well? Suggestions for improving?</p> <p>20. In general, technology is user-friendly?</p> <p>21. Technology complements and/or facilitates learning of content. Additional suggestions?</p> <p>22. Learning Objectives are being met? (Note: each learning objective is listed separately)</p> <p>23. Suggestions on learning objectives, or the order of presentation in the module?</p> <p>24. Additional suggestions on each module?</p>
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Finally, the questions addressed in the focus group were:

1. Did you find the content in each module presented clearly? Was it well organized?
2. Was the application to the classroom clear? Meaningful? Applicable?
3. What were the strengths and challenges of the technology used in the modules? Did you experience an overall learning curve in how to move around the modules on the screen? How well was the technology connected to the content?
4. Did the sequence in which the modules were ordered make sense to you? Was there a natural logic? Did you experience a learning curve through this sequence?

The overall reviews (see Table 3 for data from modules 4-7) show that these modules were found to be useful, understandable, and interesting by the majority of the reviewers. Recommendations provided by the reviewers ranged from specific changes, such as selecting different excerpts for the exercises, to a broader consideration of how to integrate the content with the technology more effectively. A very small percentage (3 out of 40) indicated that they did not find the modules to be satisfactory. Finally, specific suggestions were provided for modifying the technology used to present the modules. All reviewers expressed no major challenges with the technology except for an apparent disagreement on whether the narrator or voice-over should be a fixed or optional feature of the modules. The faculty who developed the writing modules met to review the assessment comments in order to incorporate the more general recommendations into developing modules and to revisit and revise the modules already developed. Likewise, the technical team continued to incorporate specific and general suggestions as the project continued.

Module 4		Module 5	
No.Question	Percentage	No. Question	Percentage

1	Increased awareness of the importance of previewing exercises for reading comprehension.	100.0%	Increased awareness of reasons students encounter difficulty distinguishing main ideas.	70.0%*
2.	Knowledge of application strategies for linking new learning to previous knowledge.	100.0%	Knowledge of application strategies for helping students identify main ideas and supporting details for improved reading comprehension.	70.0%*
3.	Knowledge of application strategies for generating focus and thereby increasing reading comprehension.	100.0%		
Module 6		Module 7		
No.Question	Percentage	No. Question	Percentage	
1.	Increased awareness of how annotating and taking notes can promote strong reading comprehension.	92.3%	Increased awareness of how outlining and using graphic organizers to interpret and take notes increases comprehension while reading.	80.0%
2.	Knowledge of application strategies for teaching annotation and note taking to students.	100.0%	Knowledge of application strategies for teaching outlining and mapping to students.	80.0%
			Knowledge about links to resources for a wide variety of graphic organizer models and handouts.	90.0%*

Conclusion and Future Development

Initial project assessment indicates that they meet the needs of faculty who are not trained in reading comprehension strategies but want to help their students succeed in their courses. In the coming months, we plan to deploy these modules across the State of Texas and make them available to as broad a population as possible. Additionally, the K-12 community has expressed interest in having similar

modules for use by students in high schools; we therefore plan to continue the work on development these modules for the widest applicability possible.

Acknowledgements

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