From Zero to Designing Instruction

Scaffolding in Undergraduate Instructional Design Courses

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Employees in instructional design fields are expected to have three critical areas of knowledge and skills: knowledge of instructional design, project experience, and technical writing skills, especially the ability to report on their design projects. However, students in instructional design courses come from a wide variety of backgrounds, and many have not been exposed to these areas. This paper describes a unique scaffolded curriculum cycle for instructional design courses for novice undergraduate students that integrates knowledge construction, design skills, and writing skills.

Overview

Employees in instructional design fields are expected to have three critical areas of knowledge and skills: knowledge of instructional design, project experience, and technical writing skills, especially the ability to report on their design projects. However, students in instructional design courses come from a wide variety of backgrounds and many have not been exposed to these areas, especially technical writing skills. This paper focuses on the scaffolding employed for a required, two-course sequence on instructional design and delivery for undergraduate Information Technology Services (ITS) students within the College of Education and Business Information Systems (BIS) students within the College of Business.

The Courses

The two courses are sequential; however, they have to cover different delivery systems. The first class is required for both ITS and BIS students and covers instructional design, video-based training, and online course delivery via Blackboard. The second class is only required for ITS students and covers instructional design and face-to-face training, essential for students from the College of Education. The majority of the students graduating as ITS or BIS majors seek jobs as technical support personnel. While their first jobs most likely will not require technical writing nor instructional design, as they progress or advance at their jobs, the graduates may require skills such as technical writing, instructing those they supervise, and making effective presentations. Therefore, those skills are the foundation of the courses.

Students

The only prerequisite for the sequence is a course entitled “Presenting with Media” that predominantly explores advanced uses of PowerPoint. Most students are in their senior year but have not had a course on instructional design. The students’ writing skills vary widely from very poor to above average; however, to date, none have technical writing experience.

Scope

The three projects for the courses address two types of instruction: face-to-face and online delivered via the Blackboard-based course management system. For each of the three projects, the students must demonstrate their knowledge of instructional design; they must design, develop, and deliver instruction projects; and they must write a report reflecting on the instruction they have designed. Table 1 compares the foundational core of the courses: instructional design knowledge, project stages, and corresponding report sections. The courses focus on the following phases: analysis, content design/development, instructional design/development, media design/development, formative evaluation, and delivery/implementation. The knowledge aspect includes readings for the course from the textbook, *Designing Effective Instruction* (Morrison et al., 2012) with supplementary information on motivation, advanced organizers, graphic organizers, designing for e-learning, visual design, and usability testing. The project materials are designed and developed in successive approximations (Allen & Sites, 2012) through a variety of deliverables, beginning with a exploratory analysis of possible lesson topics and ending with the completed multimedia and

print-based materials. The report includes sections for analysis, instructional design (relating to content design and instructional design decisions), media design, formative evaluation, and implementation.

Table 1

Foundational Core of the Courses

Knowledge	Project	Report
Analysis		
Ch 2: Needs Analysis Ch 3: Student Analysis Ch 3: Contextual Analysis	Lesson Topics Exploration Analysis	Analysis Section
Content Design/Development		
Ch 4: Content/Task Analysis Ch 5: Objectives Ch 6: Sequencing	Content Draft	Instructional Design Section
Instructional Design/Development		
Motivation (ARCS Article Handout) Advance Organizers (Supplement) Graphic Advance Organizers (Supplement) Ch 7: Instructional Strategies Ch 9: Developing Instructional Materials Developing Practice Activities (Supplement) Ch 12: Developing Evaluation Instruments	Pre-Instructional Activities Instructional Presentation Guided and Independent Practice Activities	Instructional Design Section
Media Design/Development		
Ch 8: Message Design Ch 10: Considerations for Technology-Based Instruction Visual Design (Supplement) Designing for E-learning (Supplement)	Completed Multimedia and Print-Based Materials	Media Design Section
Formative Evaluation		
Ch 13: Formative & Summative Evaluation Usability Testing (Supplement)	Usability Testing	Formative Evaluation Section
Delivery/Implementation		
Ch 15: Planning for Instructional Implementation	Delivery of Lesson	Implementation Section Completed Report

Sequencing

The process for each project employs the identifiable prerequisite sequencing method (Morrison et al., 2012) that follows a basic instructional design process: analysis, content design, instructional design, media design, formative evaluation (for usability testing), and implementation/delivery (see Table 1). With each step of the process, the students follow a knowledge-application-reflection cycle. They build or review knowledge about that step, apply that knowledge as they design their instructional project materials, and report on their process.

Scaffolding

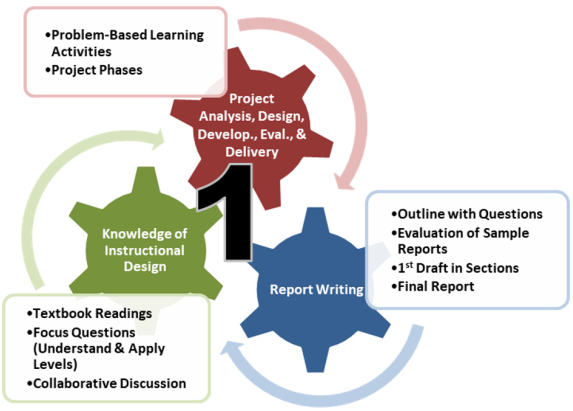
The course curriculum is scaffolded to add support to the novice students. Scaffolding involves adding structured guidance to complex instructional tasks (Wood et al., 1976). It can be in the form of giving frequent corrective feedback, providing simplified tasks to complete as precursors of the complex task, or providing reference and resource materials to assist in completing the complex task. This scaffolding is removed over time so that the end goal of having the students complete the complex instructional task independently—still remains intact. The sections that follow illustrate the way scaffolding is employed for the three separate projects.

Course 1: Project 1

The first project spans the entire first course (see Figure 1). In the first two weeks of the course, the instructor, acting as a Subject Material Expert (SME), demos four procedures that can be chosen as the topic for the projects: creating design masters in PowerPoint, touching up photos with Photoshop, creating animated gifs with Fireworks, or basic coding of HTML pages. The students use the SME-provided demo video of their chosen topic for their own lesson materials. However, they have to modify the content information because they must make the instruction match their own sample files and practice activities. Controlling the topics provides scaffolding because the content scope is appropriate for a 10-12 minute instructional video, one of the final deliverables of the project. The students work on projects individually; however, by having multiple students on the same topic, they can act as expert reviewers for each other during usability tests. The knowledge, project, and report aspects of this project work together to support the student's understanding of design. Additionally, all the topics are procedural knowledge so that narrows the types of instructional strategies needed.

Figure 1

Scaffolding in the First Project's Cycles



Knowledge

For the first project, the cycle of knowledge learning begins with having the students read a textbook chapter or supplement. As they read, they have a series of understand and apply level focus questions (Anderson & Krathwohl, 2001) to complete before attending class. During the class, the instructor brings up the empty focus question file and carries out a collaborative discussion with the students. As the students discuss the questions and how they apply to their situation, they are constructing their own knowledge of the field and tying

that to their own experiences. The instructor facilitates the discussion, clarifying and sharing her insights on the topics, as well. As the discussion progresses, the students are able to correct and amplify their own focus question answers.

Project

Since instructional design, development, and delivery is a complex task, the students begin to apply their design knowledge through problem-based learning activities (Duch et al., 2001) during class; then, they work on their design projects. The process used for the design project is analysis, design/development with formative evaluation through usability testing during the design/development iterations, and delivery. The students begin designing, developing, and delivering their own instruction. They answer planning-related questions, such as content availability, possible practice activities, technology needs, and audience availability. The project deliverables include the procedural task analysis (for usability test 1), print-based tutorial mockup (for usability test 2), final draft print-based tutorial, video-based tutorial mockup (for usability test 3), final draft video-based tutorial, instructions and practice activities (for usability test 3), and Blackboard course. The students carry out limited usability testing with one expert reviewer and two or more novice users. Finally, the students deliver the instruction by taking each others' courses.

Report

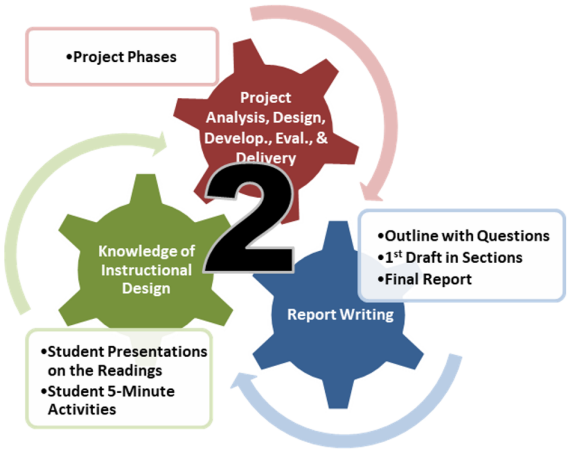
The report writing phase of the first project follows the sequencing of the textbook with sections on analysis, instructional design (including content design), media design, formative evaluation, implementation (Morrison et al., 2012). To begin the report writing process for a given section, the students first receive an outline of the section with descriptions and prodding questions. For example, the audience analysis section prompt is "Give a detailed description of the students this lesson is geared toward. Use the slides from class and the descriptions of learner characteristics from the textbook. You should describe at least 5 characteristics." Next, they read sample reports and score them based on their quality and completeness in answering the section questions. Then they are ready to write the section in accordance with their own instructional project. They turn in each section for instructor review. After completing several sections, the students meet individually with the instructor to discuss their own writing efforts. When all the sections are completed, the students submit their final report.

Course 2: Project 2

The second project takes approximately 60 % of the second class and involves the students designing face-to-face training on the evolution of a type of technology (see Figure 2). This topic limits the types of knowledge taught to facts and concepts. In the past, students have chosen everything from commonly acknowledged technologies, such as laptops and cellphones, to non-traditional technologies, such as coffee makers. To constrain the scope, the students are limited to 10-15 total minutes for their training and practice activities.

Figure 2

Scaffolding in the Second Project's Cycles



Knowledge

Since the students have completed the readings during the first course and applied them to their first project, they can take more responsibility. Individually or in pairs, they present an interactive review of the pertinent readings for 15-20 minutes with a 5-minute practice activity they have designed.

Project

For project 2, the students complete problem-based activities just for the tasks that are specific to the delivery method of face-to-face training, such as voice projection, movements and gestures, and vocal variety. The students still need much accountability. As with the first project, the students must turn in drafts of their instruction periodically through the project process so that they can do usability testing and focus on improvements. Project deliverables include a content outline (for usability test 1), presentation mockup (for usability test 2), slide design options (for usability test 2), slide design options (for usability test 2), and final presentation slides. The students carry out limited usability testing with one expert reviewer and two or more novice users. During both usability tests, the students provide the participants with a hardcopy of the deliverables and also present the information verbally. Finally, the students deliver the

instruction to an audience of their classmates.

Report

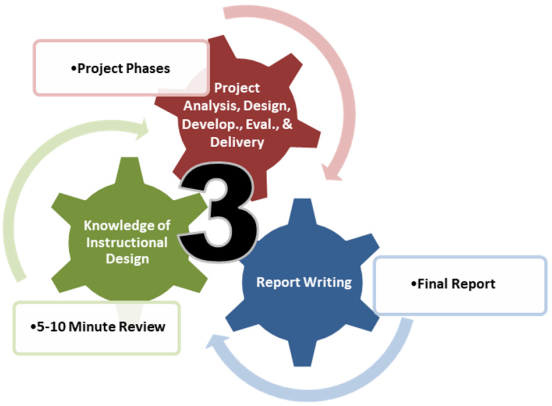
The students follow the same report outline with descriptions and prodding questions that they used for their first project. Since they have already completed one report successfully, they do not need to analyze sample reports formally, but they do have access to them. They turn in each section for instructor review and have an individual meeting with the instructor in the middle of the project. As with project 1, when all sections are completed, the students submit their final report.

Course 2: Project 3

The goal of the two instructional design courses is for students to be able to carry out their own instructional design projects. Therefore, the third design project is designed to remove the majority of the instructional scaffolding, in order to make students as independent as possible (see Figure 3). For this project, the students must design concept, procedure training based on the use of a computer program of their choice. The 10-15 minute lesson may be delivered face-to-face or via instructional video. Previous project topics include creating music tracks, job searching techniques, designing infographics, and how to select a vehicle that meets a person's needs. For classes begin with a roundtable session in which students share their progress on the project, things with which they are having difficulty, and what their plan is for the lab time. If there are areas where a number of students could use refresher instruction on an aspect of instructional design, the instructor provides a quick review. The remainder of the class is used as a lab, during which the instructor circulates and facilitates the students' design process.

Figure 3

Scaffolding in the Third Project's Cycles



Knowledge

By project 3, the students have internalized most of their knowledge of instructional design. As needed, the instructor carries out an interactive review, usually 5-10 minutes with students. Usually, if three or more students are having a need for the same instruction, this is carried out using the instructor station and is projected.

Project

There is much more lab time during the class period during project three because the readings and problem-based activities no longer need to take place. The atmosphere is like a design studio with students working on their projects with the mentoring of their instructor and creative feedback from their peers. The students make their own contract with the instructor that includes the deliverables they will be creating and their due dates. Students must carry out at least two usability tests on their deliverables. They deliver their instruction to their classmates during the last few class sessions and the exam session.

Report

By project 3, the students have also internalized much of the report writing process. They are not required to turn in individual sections; however, some students request feedback on them during class lab times. Additionally, there is a free review day ten days before the final reports are due. The majority of the students choose to submit their reports for free review; although, at that point there are usually only minor improvements needed. For the free review, the report is graded according to the report rubric and detailed feedback is given. The student can choose whether to make the revisions or submit the report as is. Thus far, most of the students who have submitted their reports for free review have also made the revisions, resulting in high-quality final reports.

Conclusions

Traditionally, graduate programs have prepared instructional designers. However, this two-course sequence introduces instructional design skills at the undergraduate level in order to expose BIS and ITS students to other ways of supporting technology endeavors.

This curriculum design provides ample opportunities for students to practice their knowledge and skills. All projects are based on authentic instructional design tasks that are at the same difficulty level. Scaffolding enables students to create high-quality materials throughout the three-project sequence, as they built up their instructional design expertise. As scaffolding is removed,

the design process is also shortened. Project 1 extends over fifteen weeks; project 2 spans ten weeks; and project 3 lasts only five weeks. While the two-course sequence is a time-intensive undertaking for both students and instructor, it results in systematically-produced instruction and design reports that are polished and effective. As projects progress, grading and feedback cycles are less frequent and take less time due to increasing initial quality as the students progress through the projects. The increasing quality of deliverables paralleled with movement toward independent work indicates that this scaffolded approach is effective.

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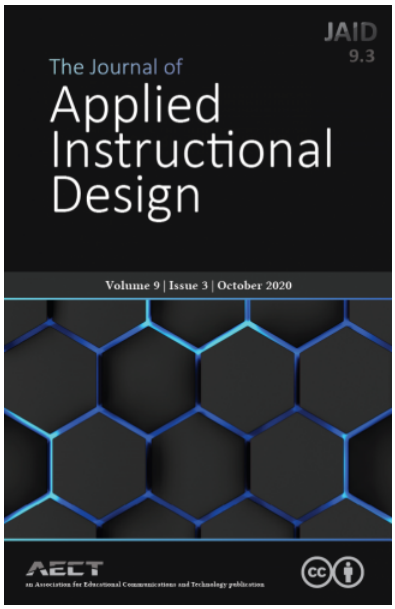

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