Instructional Design Model for Teaching Online Research Skills

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Introduction

Given the impact of Information and Computer Technology (ICT) on education, students need to be smart information seekers in the digital age. All of the skills needed in online research can be broadly categorized under the term "information literacy". Ladbrook and Probert (2011) refer to the American Library Association's (1989) definition, "To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information … information literate people are those who have learned how to learn". Some of the skills and sub skills that students will then need to acquire to navigate the digital world successfully include procedural skills (how to use a database), critical thinking skills (evaluating sites and search results), strategic thinking skills (what keywords, tools, and procedures to use to elicit specific, desired information/result) (Carnegie Mellon University, n.d). Finally, students also need to be able to integrate the information and synthesize it effectively with appropriate citations. This involves more that just going on Google and typing a word, which unfortunately is the extent of a majority of students' research skills according to many teachers. (Online) research is a complex skill and needs to be taught. According to a 2012 study by the Pew Research Center's Internet and American Life project, while most of the teachers agreed that the Internet was an extensive source of information for students, they also believed that their students often did not have the prerequisite skills to locate and use that information effectively. Forty seven percent of the 2,067 Advanced Placement (AP) and National Writing project (NWP) teachers said that they "strongly agree" and forty four percent said that they "somewhat believe" that digital literacy content should be

included in school curricula. The instructional design model that I propose will provide a framework to teach "web literacy" skills. Here, I refer to Reinhardt & Isbell's (2002) definition of the term as the "technical, critical, and analytical skills users need to effectively locate and evaluate online information according to their personal or academic needs" (p.3). For this paper, web literacy skills and online research skills may be used synonymously.

Key Design Considerations

Content/Skills

This model was developed to teach web literacy/online research skills to students to meet their academic needs. Online content reading is more cognitively taxing than regular print text reading, in that readers have to "navigate a constantly changing landscape of a hypertext reading environment" (Cho, 2014, as cited by Kingsley et al., 2015). The unit of instruction will cover key topics such as identifying keywords or search terms to put into search engines, knowing various domains like *.com, .org, .in,* etc., identifying which search results should be clicked on to read, determining credibility and relevance of information, comparing sources to evaluate their reliability, processing, synthesizing, and presenting the information, and citing sources appropriately. This means that the course content will include verbal information (identifying domains), intellectual skills (determining credibility, relevance of information; processing and synthesizing information), as well as psychomotor skills (typing, navigating through buttons, pages, hyperlinks, etc.).

Learning Theory/Pedagogical Considerations

Since the instructional goal is to acquire web literacy skills, I thought that the best way to achieve this goal is to situate learning in relevant, authentic, "real-world" tasks where students learn by engaging with the task, supported by 'experts/masters' (teachers) during the task. They also learn through collaborating with other learners, problem-solving, clearing misconceptions and developing effective strategies (Collins et al., 1991).

Target Learners

The target learners for this unit of instruction will be middle school and high school students. I have assumed that most of the target students will have little prior knowledge, or even erroneous ideas of how to do a quality web search. While designing instruction, it was also important to consider attitudinal and motivational characteristics of the target learners. Keeping them motivated, engaged, and invested in the learning experience was crucial especially because they may come into class thinking that they possess the requisite skills.

Performance Context

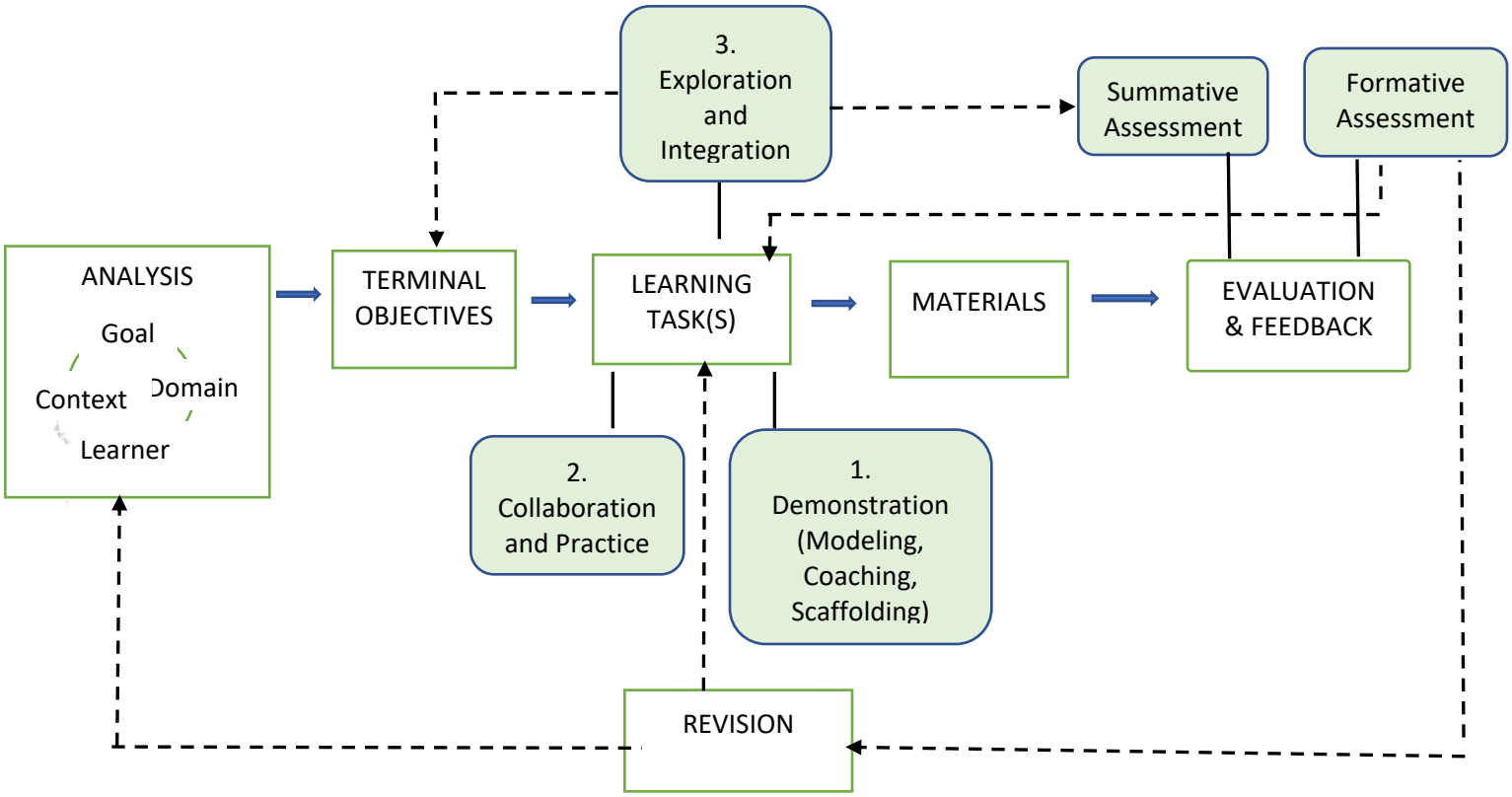
This was a key consideration while designing the instructional model. Since this is a skill that students will also use in their professional lives as well, so there needed to be an effective transfer of knowledge and skills. Therefore, tasks, activities and assessments were planned such that they are authentic and real-world relevant.

Instructional Setting and Context

Since the bulk of activities are web-based, it was important to ensure that students have access to computers and/or other devices. If the students are provided with personal

Chromebook/devices, then instruction can take place in the classroom., which would be desirable. Else, instruction can also take place in the library or media center. Since the instruction will be carried out by teachers and/or librarians (information professionals) in the classroom using school resources, there will not be any extra costs incurred.

Model



How the Model Works

The model is an adaptation of the Dick & Carey model in that it includes analysis of goals, skills, learning and learner contexts, as well as summative and formative assessments. How it differs is that instead of instructional strategy, I chose to include learner tasks as a component. One of the key considerations while designing the instructional model was that I

wanted to situate the learning in authentic and relevant tasks so that learning becomes meaningful for the learners. This is why I chose to fix instructional strategy within the learning task(s). The tasks themselves are learning environments that the learners will interact with support from the instructors, through peer collaboration and practice, and subsequently through individual articulation and exploration. The model has provisions for formative assessments at every stage of instruction which ensures continuous and immediate feedback. This will give the instructor the opportunity to revise instruction as needed. The summative assessment is the culmination of the instruction and will enable the learner to effectively demonstrate the acquired skills and knowledge and also ensure an effective transfer of the gained knowledge and skills from the academic setting to a personal or professional setting as per the learners' needs. This instructional model has been designed to teach a stand-alone web literacy class in addition to regular schoolwork. However, the nature of the instructional model is such that it can be adapted to be part of any subject class, be it ELA, Social Studies, etc.

Model Components

Analysis

The first component of the instructional design model is Analysis. The four areas of analysis is represented in a cyclical fashion in the diagram, because it is very possible that they will have to be revisited at various stages of the design process and because they are interconnected and influence each other.

Goal Analysis

The success of any learning experience is measured by the learning outcomes achieved. Clear instructional goals lead to the setting of realistic, effective, and measurable learning objectives, which in turn lead to positive learning outcomes. They bring together all the other components of the instruction effectively. A thorough analysis of the learning goals also enables us to set up realistic expectations for the learners and also spot problem areas as they navigate through the learning content. Here, the instructional goal is to teach web literacy/online research skills. This then will define the specific performance objectives which may be generating a research question, writing a research paper, or doing a literature review. This in turn will lead to the designing of appropriate learning tasks and selecting instructional materials and designing assessment.

Learner Analysis

It is also important to know your target learners really well. Demographics/group characteristics, learning preferences, attitudes to learning and teaching methods, educational and ability levels are all examples of motivational data (it tells you whether your learners are intrinsically or extrinsically motivated) that an instructional designer/teacher can use to develop an effective instructional strategy. This is especially important for this model because the learning is embedded in tasks. Therefore, this learner information will help in designing authentic, relevant tasks, and selecting instructional materials. The learners can be given an embedded attitude questionnaire (based on Keller's ARCS model guidelines) as part of entry level assessment that will provide not only about their ability and prior knowledge, but also information about their interest and attitude toward learning, motivation, and engagement levels. The instruction and learning to achieve the desired learning outcomes relies on both teacher-led

instruction and learner participation (both small group and individual). Therefore, the information from learner analysis will be valuable to assess learners' attitudes to instruction and learning, as well as in creating student groups.

Domain Categorization Analysis

Domain categorization helps in writing SMART learning objectives. Gagne proposed that the type of mental processing required for achieving outcomes in each category is different from those required in others. Therefore, the instructional "conditions" and the types of instructional support for those "conditions" will be different too. By analyzing learning objectives through these domain categories will help the teacher/instructional designer to identify the prerequisite objectives, design effective instructional strategies and appropriate, valid assessments. Online research skills require higher level of thinking, reasoning and problem-solving skills, and advanced self-regulating navigation strategies than traditional print texts (Kingsley et al., 2015). This is a complex goal that involves several domains. Categorizing these skills according to Gagne's domains of learning will help in sequencing the required skills and sub skills in an instructional analysis diagram which will ensure effective instruction planning. For instance, if the task is to learn how to use a browser like Internet Explorer or Google Chrome, then they need to be first familiar with the basic vocabulary like status bar, browser, etc. These are verbal information skills that may need to be taught first. When they are familiar with these, they can then be directed to navigate internal and external links, analyze text and images, which is a combination of intellectual and psychomotor skills.

Terminal/Performance Objectives

This is the next component of the instructional design model. Formulating clear terminal or performance objectives is important because this determines what the expectations are for this course. They should be clearly articulated and communicated to the students. For instance, rather than just saying that they will need to write a report using online research skills, clearly state that they will be expected to generate a research question, search for, and retrieve appropriate information according to the criteria specified, evaluate, and analyze the information and sources and synthesize them into a response.

Learning Task(s)

This is the third component of the instructional design model and the heart of the model. While designing this component, I considered the Cognitive Apprenticeship model, where learning takes place by engaging with an authentic task, ably supported by 'experts/masters' (teachers), and through peer collaboration, problem-solving, while effective strategies along the way. The learning tasks will be sequenced, going from simple ones to progressively working towards increasingly complex ones. Each learning task will have three phases or methods, demonstration, collaboration and practice, and exploration and integration.

Demonstration

This phase will be instructor-led, and will involve modeling, coaching, and scaffolding. Here, the teacher models activities/tasks, coaches students through similar tasks, and slowly fade support as students grow more competent and confident. This helps students acquire the "domain knowledge" (Collins et al., 1989, p.12) skills through "observation and guided practice" (Collins

et al., 1989, p.13) This also adheres to Vygotsky's Zone of Proximal Development as they enable the learner to acquire higher levels of competencies with support.

Examples. The teacher can demonstrate an interactive reading approach that utilizes top-down reading skills and strategies. The teacher can then direct the students to online reading guides and coach them through it by asking them to look over and preview the text, looking at images, highlighted parts, etc., generate a question or two that might be answered based on the text based on the preview, and then record main ideas. This process follows the Preview, Anticipate, Read, Know (PARK) method (Reinhardt & Isbell, 2002).

Collaboration and Practice

In this phase, students are grouped together and work on the tasks collaboratively. As they work on the tasks together, they will be encouraged to articulate their thinking and reasoning processes. This is important as it will indicate the effectiveness of the learning taking place and is crucial to this phase which is a knowledge and skills building phase. One way this can be done is thorough group discussions as they engage with the task. The advantage of having students engage in collaborative tasks is that it increases confidence and self-efficacy and also generates new knowledge.

Examples. The students are grouped together in pairs or small groups and assigned web pages. They will have been introduced to the unique structural elements of a webpage in an earlier learning task. They will now analyze the assigned webpage to identify its structure, organization, navigational elements, and design themes. (Reinhardt & Isbell, 2002). The groups will discuss and compare and contrast their findings, and the teacher will provide feedback.

Exploration and Integration

This phase is the culmination phase of the instruction for each learning task. This is where the scaffolds are slowly withdrawn, and the learners are encouraged to work on tasks independently. This is a crucial phase because as the learners work independently, they will be able to self-assess or self-monitor their learning, at the same time providing valuable feedback for the teachers. This phase will require the learners to integrate what they have learned and use it to solve problems.

Examples. At the end of a unit on strategic searching skills, the students can be assigned different Google Search Challenges, where they have to use the research skills to solve them. The students will need to demonstrate the process by writing down the specific steps and strategies they used to solve the challenge.

Media and Materials

The next component of the model is selection of media and materials. There is no dearth of materials on the Internet, but it is precisely for this reason that careful thought needs to be given to their selection. Most of the instructional materials will comprise of webpages, search engines that the learners will interact extensively with. Therefore, these must be tested prior to instruction to see if they are supported by the browsers (most schools have internet search restrictions). Some examples are fake websites like Pacific Northwest Tree Octopus (http://zapatopi.net/treeoctopus), online interactive reading guides like National Geographic Learning. Teachers may also develop instructional materials like online reading comprehension

passages, etc. to support the learning tasks. The instructional materials will also support the planned assessments and evaluations.

Evaluation and Feedback

This component of the model includes multiple avenues for feedback and evaluation. Feedback is obtained both from teachers and students at the various stages of instruction through assessments (both formative and summative) that are included for each learning task. Feedback is crucial to assess if a learning task is too difficult or too easy for the learners. That way, it will be possible to revise instruction accordingly. Feedback is also important for the learners as it is allows them to self-monitor their learning progress and readjust learning methods and strategies as needed. This is important for their motivation and self-efficacy. Motivational and attitudinal data will also be available through the embedded attitude questions that will be included in the formative assessments. The summative assessment is linked to the exploration and integration phase of the learning task(s) component, simply because it shares its characteristics. The summative assessment may be a literature synthesis or generating a research question and position, that will need the learners to explore, analyze, evaluate, and synthesize the information yielded.

Revision

As mentioned in the earlier section revisions will be made based on the evaluation and feedback received from the formative assessments throughout the instruction. The model allows for learning goals and objectives, learning tasks, materials, and assessments to be revisited and revised as required.

Conclusion

This model was developed to teach web literacy skills through the introduction of critical reading strategies, building computer literacy skills, and applying them to online contexts. The strength of this model is its flexibility. If the course cannot be taught as a standalone enrichment digital literacy course, then it can be adapted to any subject matter, for instance ELA, Social Science. Most teachers today assign at least one research paper to their middle and high school students. This model can be integrated successfully by teachers into their subject curricula. A limitation of this model may be that there is hardly any research available about the effect of online research skills instruction. This will probably make it difficult to evaluate or justify the effectiveness of the model. That being said, this model is a step in the right direction of the much-needed web literacy instruction for learners today.

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