Incorporating Instructional Design Approaches into Library Instruction

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Abstract

Instructional design theories and principles have contributed to education over the last century in military and workforce training, classroom teaching and online learning. Instructional design approaches can help librarians design information literacy instruction by examining learning goals in new ways. In the 1980's David Merrill was credited as the first educator to separate instructional content from learner performance through use of his Component Display Theory model. This model goes beyond creating learning outcomes. By reflecting on content types (facts, concepts, procedures, principles) separately from performance (find, use, remember), instructors can use clearly defined learner outcomes to create meaningful learning activities and design effective assessment. This workshop provided an introduction to instructional design approaches, with a focus on the Component Display Theory model. The presenter illustrated how this model has been applied to design in-person and online information literacy workshops.

Introduction

This preconference introduced attendees to an instructional design approach, the Component Display Theory (CDT) and the Content Performance Matrix (CPM), as a way to design information literacy instruction. The CPM is a tool that can help bring focus to lessons and create meaningful learning activities and assessment for in-person and online instruction.

The presenter found Component Display Theory (CDT) to be useful in designing information literacy instruction. CDT was created in 1978 based on research by Charles Reigeluth and David Merrill (Merrill, 1983). It is largely based on Robert Gagné’s work in the 1960’s and 1970’s where he established that different types of learner outcomes required different ways of assessing learning. (Gagné, 1974).

Content Performance Matrix

At the core of Component Display Theory (CDT) is the Content Performance Matrix (CPM), which encourages instructors to focus on content types (facts, concepts, procedures, principles) separately from performance (find, use, remember), to create meaningful learning activities and design effective assessment. David Merrill’s CDT builds on Gagné’s one-dimensional learning outcomes classification to create a two-dimensional CPM (Table 1).
To use Merrill’s CPM, the instructor should classify an outcome as a fact, concept, procedure or principle and then think about the learner should be able to do – remember, use or find. For example, one might classify a learning outcome such as, “LWBAT¹ identify an appropriate article database to use for his/her paper” as Use Concept. It is important to take time to classify outcomes before developing instruction because it can help focus learning outcomes and bring focus to the instruction by creating meaningful learning activities and assessment. When designing online instruction, using the CPM will ensure that fewer content updates will be required in the future because the instructor has spent time critically thinking about the goal of the instruction.

There are many variations on Merrill’s CPM. The presenter found Ruth Clark’s variation to be the most useful when applied to information literacy instruction. Clark modified Merrill’s CPM by adding by replacing “Use” and “Find” with “Apply” and adding a “Process” content type (Table 2).

In her book, Clark goes into great detail about how to classify and use each of these content types (Clark, 2009). This presentation provided an overview of Clark’s work.

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¹ LWBAT is an acronym for the “learner will be able to.”
Using the CPM

The presenter focused on concepts, procedures, process and principles since teaching facts rarely happens in information literacy instruction. Classifying outcomes is a work in progress and can be changed throughout the design phase as one work with the outcomes.

Concepts

Clark describes a concept as “a mental representation or prototype of objects or ideas that include multiple specific examples” (Clark, 2009). Table 3 describes what it looks like when a learner “remembers” and “applies” a concept.

Table 3: Clark’s CPM – Concept

<table>
<thead>
<tr>
<th>Apply Concept</th>
<th>Classify new examples.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember Concept</td>
<td>Remember the definition.</td>
</tr>
</tbody>
</table>

Clark uses a chair as an example of a concept because there are common features to a chair. While chairs come in all shapes and sizes, they usually accommodate a single sitter, have a seat and a back, and have some kind of support from the seat to the floor. An example of an information literacy concept is article databases. While there are some differences in article databases, they usually search a defined set of published articles about a broad subject area.

When teaching concepts, Clark recommends instructors define the concept, and use examples, similar examples and non-examples. A similar example for the concept of a chair might be a stool; a non-example might be a table. A similar example for an article database might be an online library catalog; a non-example could be a web site. Similar and non-examples are important so that learners understand the subtleties that define the concept. Clark also recommends using analogies to teach concepts.

Procedure

Clark describes a procedure as “a series of clearly defined steps that result in achievement of a routine job task” (Clark, 2009). Table 4 describes what it looks like when a learner “remembers” and “applies” a procedure.
Procedures can be linear (i.e. the steps for proper hand washing) or come in the form of a decision tree. Either way, the steps of the procedure need to be followed exactly to achieve the desired outcome. An example in information literacy instruction is teaching the steps to get a full-text article from within a library database.

When teaching procedures, Clark recommends avoiding “remember level” objectives. For example, instead of “LWBAT identify that UC-eLinks leads to full-text articles” (remember level), one should use “LWBAT get a full-text article from a database using UC-eLinks” (apply level). Note that the first example uses a remember level word (identify) and the second example uses an apply level word (get). Clark also recommends including steps with illustration or a follow along demonstration and practice with feedback.

Process

Clark describes process in relation to procedures. Procedures are directive; they tell someone how to do something. Processes are descriptive; they tell someone how something works. (Clark, 2009). Table 5 describes what it looks like when a learner “remembers” and “applies” a process.

Examples that Clark provides of processes are organizational workflows or depicting the stages of mechanical systems (i.e. how the brakes on your car work). While there are process content types in information literacy instruction, beware that what might initially appear has a process can actually be several learning outcomes rolled up into one learning goal. For example, “how to search a database” may seem like a process from the outset, but may really be a learning goal with several outcomes as depicted in Figure 1.
Figure 1: *Is it really a process? Examine your “process” content types to be sure they are not a learning goal with many outcomes.*

When an outcome seems like it could be a process, examine it carefully to be sure it is not a goal with multiple learning outcomes.

When teaching processes, Clark recommends avoiding “remember level” objectives, using flow diagrams to illustrate the stages of the process and animation to allow learners to zoom or view major and minor stages and to provide practice through simulations.

*Principle*

Clark describes a principle as “a task in which there are no clearly defined steps because the situation and context in which the task takes place is different each time.” (Clark, 2009). Table 6 describes what it looks like when a learner “remembers” and “applies” a principle.
Table 6: Clark’s CPM – Principle

<table>
<thead>
<tr>
<th>Apply Principle</th>
<th>Perform the task; solve the problem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember Principle</td>
<td>Remember the guidelines.</td>
</tr>
</tbody>
</table>

The presenter argued that most information literacy outcomes fall into this category. Much information literacy instruction has to do with far transfer learning which encourages learners to build mental models so they can apply what they have learned to different situations. When librarians teach students strategies to search a specific database, many hope that students will be able to use similar techniques in any database they may want to search in the future.

When teaching principles, Clark recommends using lots of examples, non-examples and analogies. Particularly in e-learning, Clark recommends instructors include a combination of worked and partially worked examples. Examples of this can be seen in the presenter’s online tutorial on slides 24-31, where PubMed is the worked example and BIOSIS Previews is the partially worked example.

The CPM and Assessment

Instructional design approaches encourage instructors to create formative and summative assessment activities and quizzes before developing the instruction. This ensures that assessment will closely match learning outcomes. If instructors spend time classifying outcomes using the CPM, it becomes easy to create meaningful assessment. An earlier example of “remember” and “apply” level objectives illustrates this point. If an objective is written at the remember level, e.g. “LWBAT identify that UC-eLinks leads to full-text articles,” then the assessment might simply be a multiple choice question that asks learners to identify the name “UC-eLinks” from a list. Alternatively, if the outcome is written at the apply level, e.g. “LWBAT get a full-text article from a database using UC-eLinks,” then the assessment would need to include a way for learners to demonstrate that they can use UC-eLinks correctly. The way one classifies an outcome illuminates the type of assessment needed.

Example

After an introduction to Clark’s CPM, the presenter discussed at length how she has used the classification for her learning outcomes for an online tutorial created to replace in-person instruction to undergraduate biology students. The presenter provided information about the design and development of the outcomes and tutorial.
Activity

Attendees were given the opportunity to practice classifying their own learning outcomes with feedback from their peers and the presenter.

Conclusion

The Content Performance Matrix (CPM) is a tool that can be used to help instructors design more meaningful instruction by reflecting on content separately from performance. Using this instructional design tool can help bring focus to lessons and create meaningful learning activities and assessment for in-person and online environments.

References

