CHAPTER 13

Using the Instructional Design Process to Effectively Apply UDL to OER:

Considerations, Limitations, and Best Practices

Michael Chee and Kari D. Weaver

Introduction

In recent years, the Universal Design for Learning (UDL) framework has begun to have a significant impact on the instructional sphere of academic libraries, shifting how programs are designed, developed, and delivered. In related work, academic libraries are increasingly involved in supporting faculty instructors in their use of open educational resources (OER), where UDL principles equally apply. Incorporating a UDL approach to OER development and use is beneficial for creating accessible, inclusive learning objects that better suit the learning needs of all. Drawing on the theoretical knowledge and practical experience of the authors, as well as an ongoing qualitative study of faculty perceptions of OER, this chapter discusses (1) the special importance of enacting UDL principles for OER, (2)

CC BY NC

how best to align the instructional design process with OER development models for a final result that efficiently and effectively satisfies UDL principles, and (3) a series of best practices for enacting UDL principles within OER outputs, including from an adoption and an adaptation perspective.

Conversations: UDL in OER

Discussions of UDL within OER in the literature are modest, with an emphasis on how incorporating UDL principles enables and supports adherence to accessibility requirements and considerations.[1] Other discussions of UDL and OER in the literature revolve around a precursor to OER use: the discoverability of OER, particularly the challenges practitioners face in tracking down and assessing quality OER.[2] While the connection between a UDL mindset and improving accessibility of learning is well-established, fewer studies have discussed the application of UDL principles to OER projects, and such studies that do exist have reported on singular cases.[3]

Throughout these discussions, a key aspect of the OER context that impacts UDL implementation has been overlooked: the extreme variability of use. OER serve a dual purpose, both as learning objects in their own right and as modular building pieces within a larger educational or curricular context. The situation is further complicated as OER have two lives: the first for the educational context they were initially designed for and a second where they may be used by others in myriad unforeseen or unintended ways. The form of the OER may also change during this second life, as OER are meant to provide flexibility of use through open licensing. Within a new context, an OER could be adopted wholesale, just a portion of interest could be taken, or elements of interest could be sheared off from the whole, re-organized, and combined with pieces of other OER to create a new whole. Enacting UDL within the OER context requires consideration beyond a narrow focus on accessibility compliance, impact on discoverability, and application in singular cases. A holistic approach is needed that supports each of these key areas and can simultaneously communicate design intent for the second life of the OER.

The authors' treatment of UDL and OER here proposes to do just this, premised particularly on adopting an intentional instructional design process with clear roles and outputs at each discrete stage to support widespread enactment of UDL within OER. This approach is particularly reflective of the actors within the OER environment: instructors creating learning objects for their own purposes that are then made available as OER and instructors looking for OER to fulfill a particular instructional need that they have identified within their context. Defining the process and these distinct roles are also useful to inform funding applications for OER development.

Alignment Between UDL and OER

Universal Design is a system used across a wide variety of sectors outside of higher education, especially in the context of built environments. Within education, these principles have been adapted into Universal Design for Learning as a method to make materials more readily accessible to the largest possible audience of learners.

UDL has three main principles.[4] BCcampus, a Canadian leader in OER, explains what these three principles mean in practice:

- "**Provide multiple means of engagement.** This is the *why* of learning. It looks at designing learning experiences that provide options to motivate students to learn.
- **Provide multiple means of representation.** This is the *what* of learning. It looks at how the content is being presented to students and aims to create content that gives students options in how they engage with that content.
- **Provide multiple means of action and expression.** This is the *how* of learning. It looks at the options students have for demonstrating and managing their knowledge and learning."[5]

Similarly, core OER principles are conveyed through David Wiley's 5Rs of Openness:

- "Retain – the right to make, own, and control copies of the content
- Reuse – the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video)
- Revise – the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language)
- Remix – the right to combine the original or revised content with other open content to create something new (e.g., incorporate the content into a mashup)
- Redistribute – the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend)."[6]

UDL principles align strongly with some of the core principles of OER:

- Both UDL and OER are implemented to reduce barriers to access for a wide variety of students. The foundational OER requirements of Revise and Remix address UDL by expanding the learning pathways, methods, and modalities that can be used, thus decreasing barriers to learning.
- Both UDL and OER must focus on designing materials in a way that addresses the variability of students who may engage with the final content. The foundational OER concepts of Redistribute and Reuse, considered in the context of UDL, allow instructors to use shared material that expands instructional approaches, illuminates core concepts in different ways, or better meets the needs of varied students. Instructors often have preferred methods of instruction that are comfortable; strategic identification and reuse of OER allows expansion of these approaches in ways that support a wider variety of learner needs.

These natural alignments between UDL and OER may lead one to believe that implementing UDL in the online learning context should be easy. However, in practice, this is not the case. Several reasons seem to contribute to this, including uneven awareness of how UDL manifests in teaching practice. The complexity of the online learning environment further complicates matters, as UDL principles must be considered throughout the development process and in such a manner that they have been effectively enacted at the point the material is disseminated—they cannot be an afterthought.

Instructional design, however, can serve as an important bridge between UDL and OER. Instructional design principles and the instructional design process already align heavily with UDL principles.[7] While it is difficult to build UDL principles into OER after the fact, we have found that building learning objects following instructional design best practices both supports successful implementation of UDL principles and delivers quality OER products:

- Creating instructional content intentionally—through a process that accounts for the needs of learners, uses iterative development strategies, and incorporates expertise from a variety of stakeholders—ensures that multiple perspectives are considered throughout the creation of the learning object. To create learning objects that support multiple means of engagement, the reason for the learning and the need must be established and taken into consideration.
- Multiple means of representation can be effectively addressed by carefully crafting and organizing content through the Task Analysis stage, and by thoughtful consideration during Storyboarding, as discussed in more detail later in this chapter.
- Finally, multiple means of action and expression, though subject to the limitations of the design tools and hosting platforms used for OER, can be strategically integrated so learners are able to check their knowledge and verify their learning throughout the resource.

By following a clear process for OER development, instructors can ensure that UDL principles are incorporated throughout OER objects, supporting both the usage of OER material in its original context and in future representations as well.

Intentionally Designing OER

UDL relies on good design; applying UDL to OER relies on using a good design process. A good design process also serves as an organizational frame when working within a role-based collaborative team, helpfully conveying the vision, status, and needs of a project. While the focus of the design process described here is on creating new OER, a thorough understanding of development considerations is helpful in OER adoption or adaptation. Individuals can use an abbreviated version of this process or identify the stage in the design process at which they are entering the work for their use case.

A number of OER workflow models have been presented in the literature, notably one created by Billy Meinke.[8] Meinke's workflow is popular and has been widely reproduced in various forms.[9] Other workflow models include one from Lisa Rogers,[10] one from Kwantlen Polytechnic University,[11] and CORRE.[12] These workflows share commonalities in identifying the broad scope of the work required to develop an OER project from nothing, and some include information on gathering the right team, the technology to use, and potential funding opportunities. However, these workflows are less detailed when it comes to the steps needed to undertake the actual development and design/redesign of an OER.

One of the most impactful ways to enact UDL in a newly created OER is to preserve elements produced at each stage in the design process and publish them with the final product. Doing so presents a clear trail that potential adopters and adapters of the OER

can consult to see how the resource was developed and streamlines developing OER for different formats, contexts, and platforms. As such, the authors present below detailed instructions on creating OER, with an emphasis on division into stages, with an output for each stage.

The authors have had great success in using a modified instructional design process* to develop open learning objects (figure 13.1). This process consists of six distinct stages: Needs and Learner Analysis, Task Analysis, Storyboarding, Design, Testing and Assessment, and Dissemination. Each stage has some work that requires a particular set of knowledge and skills. The authors found it useful to conceptualize the work that needs to be completed within each stage by identifying the key roles that would take it on. These five key roles are instructor, learner, subject matter expert (SME), instructional designer, and project manager. Multiple roles may be taken on by the same individual if they have the needed range of knowledge and skill. For example, since the project manager is involved in every stage, they are a good candidate to substitute into other roles if they have the required expertise. The intent behind framing this process by role is to help with project planning. The diversity of roles involved in developing OER has been identified in the literature[13] in recognition that OER development is often a highly collaborative undertaking.

Part of the value of this process is that in many contexts, the people involved in the development of OER do not generally have this as their singular full-time job and are instead doing OER development as a component of wider and diverse portfolios. The ability to bring together different stakeholders for the same purpose only at point of need is critical for successful development. This is particularly true in aligning UDL with OER because the knowledge and considerations needed for UDL implementation are not necessarily needed at every stage or within every role. When assembling your team and assigning roles, ensure that the instructional designer and project manager roles go to people who are knowledgeable about and committed to applying UDL in practice.

Stages of the Instructional Design Process

STAGE 1: NEEDS AND LEARNER ANALYSIS

The design process begins with a Needs and Learner Analysis, which determines the instructional needs to be addressed by the OER. This analysis may be conducted in several different ways, from more formalized research with students using focus groups, interviews, or surveys to learning needs identified by an experienced instructor. The key roles in this stage include: the instructor, who is able to identify the need for an OER and instigate the project; the learner, who should be consulted to help determine what resources are needed and valued; and the project manager, who coordinates efforts and keeps the project moving into the next stage. This analysis should ideally be pulled together into a brief report by the project manager, which can be shared with other key roles throughout the design process and should be made available as an ancillary resource when the OER is published.

* Based on the instructional design process from: Gary R. Morrison, Steven M. Ross, Howard K. Kalman, and Jerrold E. Kemp, Designing Effective Instruction, 7th ed. (Hoboken: Wiley, 2013).

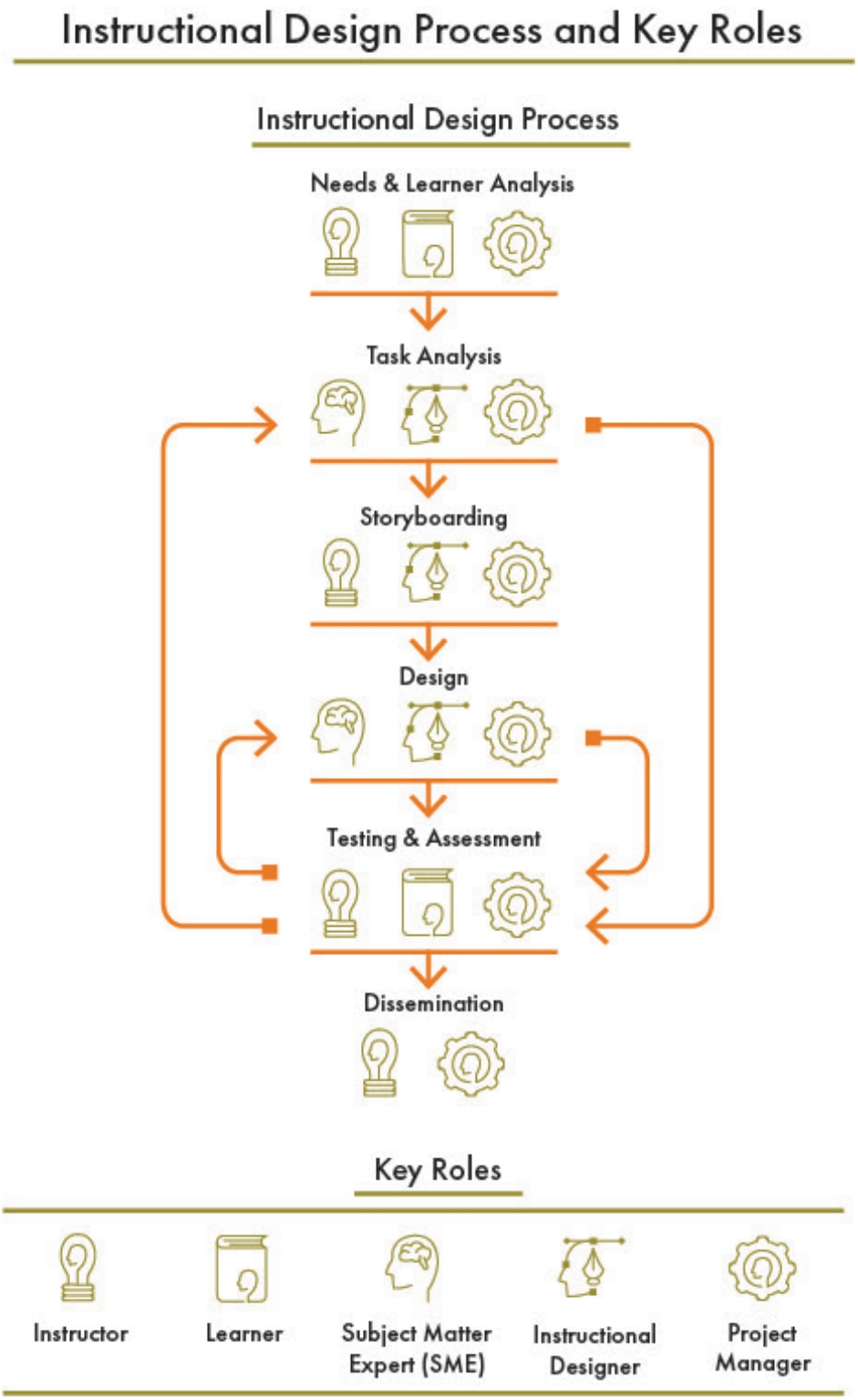

Figure 13.1. "Instructional Design Process and Key Roles" (2022), design by Janna Kholodova, content by Michael Chee, licensed under CC-BY-NC.

STAGE 2: TASK ANALYSIS

Once learning needs have been identified, the next step is to produce a Task Analysis. (For the Task Analysis template used by the authors, see appendix A.)* This stage may also be considered as the content development stage. Before this stage begins, it is important for the project manager to lead a conversation about the open licensing (the authors recommend Creative Commons licensing) of the final OER with both the subject matter expert (SME) and the instructional designer. A completed Task Analysis will include, in text form, all the content that will end up included in the final OER. Writing up the Task Analysis is undertaken by the SME(s), who may be the same individual as the instructor but may also be anyone brought on to the project as an expert on the topic of interest. At this stage, and to support the application of UDL principles in the next stage, the content should be added to the Task Analysis with as little consideration of final design as possible. In the authors' experience, SMEs at this stage are tempted to consider how the content will be ultimately presented, which may influence the way content is organized. By emphasizing a divorce between content and design considerations, SMEs are able to produce a Task Analysis of platform-agnostic content, with organization of information dictated by the content itself.

The Task Analysis stage is highly iterative, with drafts reviewed by both the instructional designer and the project manager, who offer feedback and questions designed to improve the organization of the content. The instructional designer may also check their understanding of the content with the SME to ensure that they understand the presentation needs of the content. Once an initial final draft of the Task Analysis is ready, it should be reviewed by the instructor and the learner roles as part of the cyclical Testing and Assessment stage. This check helps ensure that the content is aligned with instructor and learner needs. A check-in at this stage is critical for catching any unexpected gaps in the content of the Task Analysis. It is far more efficient from a project management perspective to address content issues at this stage than to realize later in the design process that SMEs need to be re-involved. Once a Task Analysis has been completed, it should be saved as an ancillary resource to be made available along with the final OER.

STAGE 3: STORYBOARDING

Once the team produces the final Task Analysis, they can begin the Storyboarding stage. The instructional designer considers the best way to present the content to support positive learning outcomes. To reflect UDL principles, this consideration should emphasize providing choices to the learner: multiple ways to proceed through the content, multiple options for interaction and formative assessment activities with the content, and the information presented in multiple forms and formats. This consideration should also draw on pedagogical best practices for online learning and may also be influenced by availability of resources (e.g., producing a video may not be feasible without filming equipment). Discussion between the instructional designer and the project manager is useful at this

* Examples of completed task analyses can be found as additional assets published alongside many OER modules on Waterloo Library's Online Learning Object Repository.

stage to ensure that options for design are feasible within the scope and timelines of the project and should also include consideration and investigation of final hosting platforms or options. The instructional designer tentatively maps out the form that content will take and uses a representative section from the Task Analysis document to create a rough prototype or mock-up. The instructional designer shares this prototype with the instructor as an opportunity to ensure that the visions of both roles align. Initial design considerations include color scheme and fonts. Types of interactive elements are also typically considered during the Storyboarding stage to ensure alignment between the instructional designer and Instructor. The Storyboarding stage is iterative and may require several drafts and discussions between the instructional designer and the instructor before they produce a final version. Ideally, they make a final storyboard and prototype available when the OER is published.

STAGE 4: DESIGN

Once the team produces a final storyboard and prototype, the Design stage begins. Following the storyboard, the instructional designer builds out the rest of the content from the Task Analysis according to the vision established by the prototype and discussions in the Storyboarding stage. Considerations for implementing UDL from the Storyboard stage, in providing choices to the learner, should likewise be incorporated at this point. Knowledge of technical accessibility requirements (e.g., WCAG 2.0/2.1) is critical during this stage. The instructional designer should have a good sense as to the presentation needs of the content from discussions with the SME during the Task Analysis stage. However, once an initial design of the OER has been completed by the instructional designer, the SME should be brought into the process again to ensure that the design has not inadvertently altered meaning.

STAGE 5: TESTING AND ASSESSMENT

Once checked by the SME, the first final design should be reviewed by the instructor and the learner roles once more as part of the cyclical Testing and Assessment stage. The focus of this check is on functionality and the learner experience to ensure that the OER behaves as expected. This is also a good opportunity (depending on OER format) to have testers track how much time it takes them to work through the OER; this information may be included at the beginning of the OER to guide learners and potential adopters. Part of this testing should include a focus on accessibility, ensuring that content meets WCAG standards. Finally, to ensure that the OER is effective in meeting the original learning needs, the learner role should undertake an assessment exercise to evaluate the success of the instructional intervention.* In particular, this exercise should emphasize noting the instances and quality of the multiple options for engagement, representation, and expression for the learner. While individual testing and assessment approaches will be dictated by local needs and resources, anyone looking for guidance on the types of questions to ask or how to structure the needed feedback should consult usability testing and user

* For further guidance, see Rena M. Palloff and Keith Pratt, *Assessing the Online Learner: Resources and Strategies for Faculty* (San Francisco: Jossey-Bass, 2009).

experience literature.† Results from the Testing and Assessment stage should ideally be pulled together into a brief report by the project manager, shared with stakeholders from the project, and released as an ancillary resource when the OER is published. Throughout this Testing and Assessment stage, the instructional designer should be available to update the final design of the OER in line with findings, with particular attention to including directed questions or tasks related to intentional UDL elements.

STAGE 6: DISSEMINATION

Once feedback from the Testing and Assessment stage has been implemented, the final OER is complete and the Dissemination stage begins. This stage involves the instructor and project manager roles: the instructor ensures local use of the OER by deploying it within their own course and can advertise to interested parties by word of mouth, while the project manager focuses on adding the OER to a repository. To support UDL, the project manager should gather outputs from each stage of the Instructional Design process to include with the OER as supplementary materials. At minimum, this should include the Task Analysis, Storyboard, and the final OER but would also benefit from the inclusion of the Needs and Learner Analysis and Testing and Assessment reports. Though Dissemination is the final stage, hosting options for OER should be considered at an earlier point in the process. It is advisable to begin exploring hosting solutions once the specific format of the content has been established in the Storyboarding stage.

Best practices for UDL application within OER

Design Documentation and UDL Enactment

Thoughtfully following an intentional design process for UDL in OER must be strongly supported by corresponding documentation practices. This allows others to understand holistically how the OER was developed and how principles like multiple means of representation were integrated throughout. For example, a video-based OER may be of interest to someone, but they might want to present the information to their audience in a text-based format. This approach is aligned with UDL as it presents content through multiple means of representation, but doing so by working from the Task Analysis documentation is far more efficient than retroactively trying to determine content structure by pulling from the video's transcript.

As discussed in more detail below, the core principles of UDL—emphasizing flexibility to offer alternatives to learners—are enabled by including as many outputs from each stage of the development process as possible. Doing so enables and supports UDL across the range of OER use and particularly helps bring UDL principles into open education practice.

† For further guidance, see: Aaron Schmidt and Amanda Etches, *Useful, Usable, Desirable: Applying User Experience Design to Your Library* (Chicago: American Library Association, 2014).

FIRST LIFE. ENACTING UDL WITHIN OER CREATION

The first life of an OER is its role for the context it was designed for. The previous section laid out an instructional design process that the authors have used to develop open learning objects in a collaborative, team-based context. This design process is particularly effective for enacting UDL within the first life of an OER by separating content development and design into two separate and distinct stages, with two different roles taking the lead in each case; the SME for the Task Analysis stage and the instructional designer for the Design stage. Separating these two stages allows the SME to focus on surfacing their expert knowledge of a topic, which may include their biases around the optimal way to present and engage with content. In particular, the instructional designer is the catalyst for UDL application and needs to pay close attention to sections within the content that would benefit from providing options to the learner. As highlighted in the literature, the instructor and SME roles within OER development are experts in their teaching field but encounter challenges when it comes to instructional design.[14] Using a design process that supports a division of labour according to skill sets allows for more efficient project progression and represents a concrete step for enacting UDL in OER development.

SECOND LIFE. SUPPORTING UDL IN THE OER CONTEXT: QUESTION OF QUALITY

The second life of an OER comes after it has been published, when it is publicly discoverable and usable by a global audience. One of the biggest concerns cited in the literature on faculty perceptions of OER revolves around a concern for quality.[15] Limited information exists about what constitutes quality, although a recent qualitative study undertaken by the authors has highlighted quality as an individually mediated "fit for purpose" consideration.[16]

As discussed above, UDL and OER are well-aligned philosophically from a "freedom to modify" standpoint. However, how UDL manifests within the OER context is entirely mediated by the particular use scenario (figure 13.2). Creating an OER from scratch (first life) is the surest way to fulfill UDL and to achieve alignment with learning objectives, but to do so is resource-intensive and takes time. OER may also be adopted or adapted; they have theoretically less resource-intensive use scenarios but ones that require the instructor to surrender the control they would have if simply creating from scratch. Perhaps due to this loss of control, OER is frequently adopted and adapted as an ancillary resource, in line with UDL principles, as an additional means of presenting a topic.[17] There are particular considerations that should be taken for both adopting and adapting an OER.

Adopting an OER means finding something online that entirely satisfies your instructional objectives and using it whole and "as is" in your instruction (figure 13.2). Determining whether an OER satisfies your instructional objectives can be challenging in practice, representing hours browsing through content to see if it aligns with your needs. To help streamline this process, instructors searching for OER to adopt should first undertake their own Needs and Learner Analysis, which can help isolate what exactly they are looking for. When browsing OER, adopters can look for information conveyed in learning

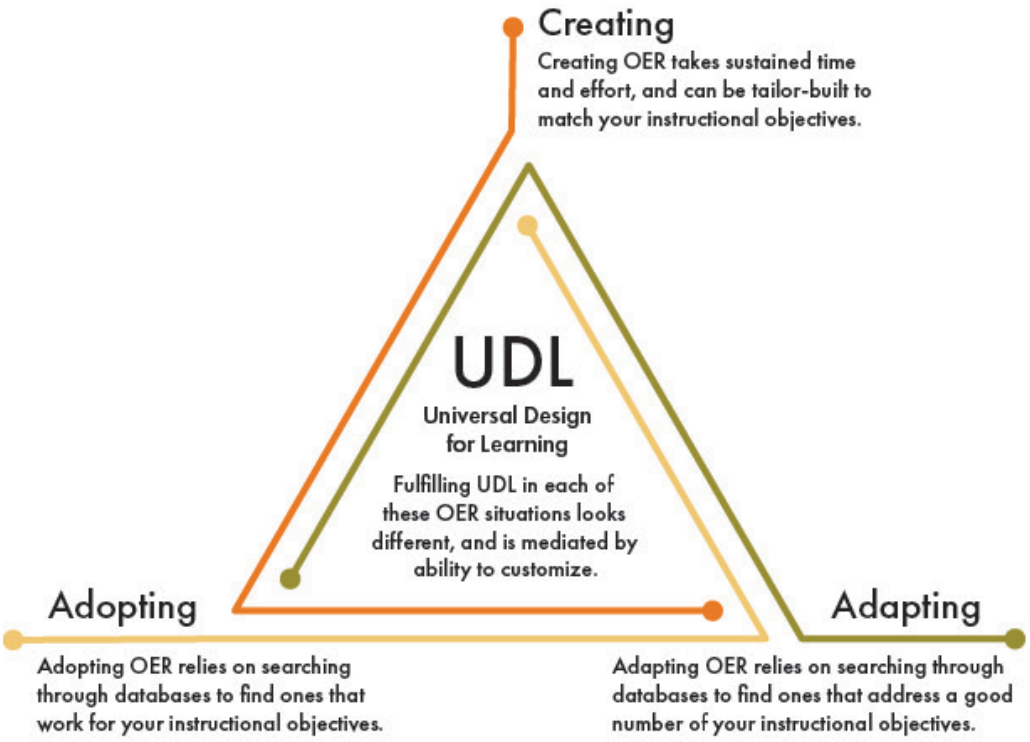

Figure 13.2. "UDL implementation by OER use case" (2022), design by Janna Kholodova, content by Michael Chee & Kari D. Weaver, is licensed under CC-BY-NC.

objectives and intent statements to see if their use situation is aligned with that for which the OER was originally designed. This is particularly valuable from a UDL perspective, as an instructor thinks through what will best support their students in terms of options for engagement, representation, and expression. Adopters can accomplish this comparison process most efficiently if the original creators of OER included supplementary documentation from their Needs and Learner Analysis and Task Analysis stages.

Adapting an OER means finding something online that largely satisfies your instructional objectives and could be used with some minor modifications (figure 13.2). While this use scenario still represents significant time investment browsing through content to see if it aligns with your needs, the ability to customize means that searching does not need to be as comprehensive since the fit only has to be "good enough." To help streamline this process, instructors searching for OER to adapt should first undertake their own Needs and Learner Analysis, which can help isolate what exactly they are looking for in terms of content and options for engagement, representation, and expression. When browsing OER, adapters can look for information conveyed in learning objectives and intent statements to gauge how well their use situation is aligned with that for which the OER was originally designed. This comparison process can be accomplished most efficiently if the original creators of OER included supplementary documentation from their Needs and

Learner Analysis and Task Analysis stages. Adapting an OER is particularly encouraged for enacting UDL as it provides great freedom to build in additional options for engagement, representation, and action within content. Strong documentation practices also explicitly communicate intentional UDL decisions that were made during the task analysis, storyboarding, and design stages to ensure future adapters perpetuate those elements.

DOCUMENTATION *IS* COMMUNICATION

Because UDL implementation within OER development requires a team composed of individual roles with specialized knowledge, using standard documentation is essential for the successful implementation of best practices. It is easy for intentional decisions that support UDL uptake to be lost throughout the process if they are not explicitly indicated and subsequently applied. This need for robust documentation practices enables success within the first life of an OER but is equally essential for second life OER instances. Best practices also dictate, as mentioned throughout the stages outlined earlier in the chapter, that creators for first life OER select dissemination options that allow for the practice of sharing development documentation in addition to the final OER developed.

Licensing OER for UDL

Of the three use cases for OER (figure 13.2), the adoption case is the least supportive of UDL principles as it relies on finding and using in whole just the right resource that fits the instructional context at hand. While adoption applied correctly may support UDL in some cases (e.g., a short OER video meant to illustrate a concept, included alongside your own textual explanation), open licensing that restricts OER to the adoption use case imposes significant restrictions on how UDL may be enacted in the second life of an OER.

Creative Commons (CC) licenses are one of the most popular open license schemas and include six different license options with different permissions. In particular, the two CC licenses that include the No-Derivatives (ND) condition represent licensing that runs contrary to the customizability benefits of OER and has been criticized as such in the literature.[18] Disallowing derivatives prohibits remixing of OER content and means that, especially in larger OER (e.g., course, module, tutorial, textbook), UDL principles cannot be enacted by building in additional options for learners. Licensing OER appropriately is thus also a critical and easily overlooked aspect of enacting UDL in OER, with suggested best practice to avoid the use of No-Derivative conditions.

Continuing Tensions

This chapter suggested a well-documented OER development process as a robust strategy for enacting UDL within OER for both their first and second lives. While this approach is helpful, the authors recognize some continuing tension endemic to the OER context, in that an OER changes every time it gets picked up. Original authors have no control over the way their OER is used once they release it "into the wild." In truth, the only way UDL can be addressed is at the point of use, if UDL is front of mind and attention is paid to what is in the OER and what will be presented alongside the OER.

Individuals interested in any aspect of OER adoption, adaptation, or creation, and who are also invested in UDL, must expend time and effort collecting and honoring information gathered from real learners on their needs, experiences, current levels of knowledge, and learning preferences. While the instructional design process has a built-in stage—Needs and Learner Analysis—that provides structure and methods to collect such information, it is a step that is tempting to circumvent in service of moving forward swiftly on tight timelines. The current workflows literature on OER development also marginalizes this critical development stage that foundationally informs intentional UDL integration. The best practices presented above may help support UDL enactment within the OER context, but fulsome enactment continues to rely on the will, intentionality, expertise, and prioritization of UDL principles by the actual people creating and using OER.

APPENDIX A. TASK ANALYSIS

List of Tasks:

1. Main topic: (Level 1 heading)
    1.1. Subtopic (Level 2 heading)
    1.2. Subtopic (Level 2 heading)
        1.2.1. Sub-subtopic (Level 3 heading)
            1.2.1.1. Sub-sub-subtopic (Level 4 heading)
    1.3. Subtopic (Level 2 heading)
        1.3.1. Sub-subtopic (Level 3 heading)

2. Main topic (Level 1 heading)
    1.4. Subtopic (Level 2 heading)
        1.4.1. Sub-subtopic (Level 3 heading)
        1.4.2. Sub-subtopic (Level 3 heading)
    1.5. Subtopic (Level 2 heading)
        1.5.1. Sub-subtopic (Level 3 heading)
    1.6. Subtopic (Level 2 heading)
        1.6.1. Sub-subtopic (Level 3 heading)
        1.6.2. Sub-subtopic (Level 3 heading)
        1.6.3. Sub-subtopic (Level 3 heading)

Breakdown of Tasks:

Module	**Specific Task**	**Assessment**
1. Main topic (Level 1 heading)	**Welcome message/ learning outcomes**	
1.1 Subtopic (Level 2 heading)		
1.2 Subtopic (Level 2 heading)		
1.2.1 Sub-subtopic (Level 3 heading)		
1.2.1.1 Sub-sub-subtopic (Level 4 heading)		
1.3 Subtopic (Level 2 heading)		
1.3.1 Sub-subtopic (Level 3 heading)		
2. Main topic (Level 1 heading)		
2.1 Subtopic (Level 2 heading)		
2.1.1 Sub-subtopic (Level 3 heading)		
2.1.2 Sub-subtopic (Level 3 heading)		
2.2 Subtopic (Level 2 heading)		
2.2.1 Sub-subtopic (Level 3 heading)		
2.3 Subtopic (Level 2 heading)		
2.3.1 Sub-subtopic (Level 3 heading)		
2.3.2 Sub-subtopic (Level 3 heading)		
2.3.3 Sub-subtopic (Level 3 heading)		

Notes

1. Valéria Farinazzo Martins et al., "Accessibility Recommendations for Open Educational Resources for People with Learning Disabilities," in *Trends and Innovations in Information Systems and Technologies*, Vol. 3, eds. Álvaro Rocha et al. (Switzerland: Springer, 2020), 387–96, https://doi.org/10.1007/978-3-030-45697-9.
2. Francisco Iniesto et al., "Challenges to Achieving a More Inclusive and Sustainable Open Education," *Journal of Interactive Media in Education* (2021), http://doi.org/10.5334/jime.679; Francisco Iniesto, "An Investigation into the Accessibility of Massive Open Online Courses (MOOCs)" (PhD diss., The Open University, 2019). http://dx.doi.org/10.21954/ou.ro.0001117a; Bryan Chimbo, Paola Ingavélez-Guerra, and Salvador Otón-Tortosa, "Accessibility Metadata: A Proposal for the OER's Evaluation Considering Quality Models," in *2021 IEEE Fifth Ecuador Technical Chapters Meeting (ETCM)*, eds. Mónica Karel Huerta, Sebastián Quevedo, and Carlos Monsalve (Cuenca: IEEE, 2021), https://doi.org/10.1109/ETCM53643.2021.9590799.
3. Robert P. Dolan and Kim Ducharme, "Adaptivity in the Wild: Individualizing Reading Supports in Open Learning Scenarios," in *Innovations in Learning and Technology for the Workplace and Higher Education Proceedings of 'The Learning Ideas Conference' 2021*, eds. David Guralnick, Michael E. Auer, and Antonella Poce (Switzerland: Springer, 2022), 352–63, https://doi.org/10.1007/978-3-030-90677-1; Mollie Peuler and Mark Coltrain, "Flip this House!: Updating and Designing an Online First Year Seminar Module Series," *Journal of Library & Information Services in Distance Learning* 14, nos. 3-4 (2020), https://doi.org/10.1080/1533290X.2021.1880527.
4. "Universal Design for Learning Guidelines version 2.2," CAST, last modified 2018, https://udlguidelines.cast.org.
5. BCcampus OER Production Team, *Getting Started: OER Publishing at BCcampus* (Victoria, BC: BCcampus, 2021), 21, https://opentextbc.ca/gettingstarted/.
6. David Wiley, "The Access Compromise and the 5th R," last modified March 5, 2014, https://opencontent.org/blog/archives/3221.
7. Kavita Rao, "Inclusive Instructional Design: Applying UDL to Online Learning," *The Journal of Applied Instructional Design* 10, no. 1 (2021), https://dx.doi.org/10.51869/101/kr.
8. Billy Meinke, "An OER Production Workflow for Faculty," last modified February 2017, https://oer.hawaii.edu/an-oer-production-workflow-for-faculty/.
9. Abbey Elder, *The OER Starter Kit* (Iowa: Iowa State University Digital Press, 2019), chap. "Planning and Completing Your OER Project," https://iastate.pressbooks.pub/oerstarterkit/; Jemma Forgie, *University of Alberta OER Starter Kit* (Alberta: University of Alberta Library, 2019), chap. "Planning and Completing Your OER Project," https://openeducationalberta.ca/oerstarterkit/; Regina Gong, "Production of OER Worklow," last modified September 2020, https://www.oercommons.org/courseware/lesson/78283/overview?section=1; Chris Diaz, "A Production Workflow for OER Projects," last modified May 2020, https://www.northwestern.edu/open-educational-resources/docs/oer-production-workflow.pdf.
10. Lisa Rogers, "OER Workflow Diagram," last modified November 16, 2009, https://cccoer.wordpress.com/2009/11/16/oer-workflow-diagram/.
11. "Open Textbook Publishing Workflow," OPUS, accessed April 29, 2022, https://www.kpu.ca/sites/default/files/Library/Open%20Textbook%20Publishing%20Workflow%20v%204.0.pdf.
12. Samuel K. Nikoi, Tania Rowlett, Alejandro Armellini, and Gabi Witthaus, "CORRE: A Framework for Evaluating and Transforming Teaching Materials into Open Educational Resources," *Open Learning: The Journal of Open, Distance and e-Learning* 26, no. 3 (2011), https://doi.org/10.1080/02680513.2011.611681.
13. Apurva Ashok and Zoe Wake Hyde, *The Rebus Guide to Publishing Open Textbooks (So Far)* (Montreal, Quebec: Rebus Community, 2019), chap. "Roles & Responsibilities," https://press.rebus.community/the-rebus-guide-to-publishing-open-textbooks/.
14. Xinyue Ren, "The Undefined Figure: Instructional Designers in the Open Educational Resource (OER) Movement in Higher Education," *Education and Information Technologies* 24, no. 6 (2019), https://doi.org/10.1007/s10639-019-09940-0.
15. TJ Bliss et al., "An OER COUP: College Teacher and Student Perceptions of Open Educational Resources," *Journal of Interactive Media in Education* (2013), https://doi.org/10.5334/2013-04; Rajiv S. Jhangiani et al., *Exploring Faculty Use of Open Educational Resources at British Columbia Post-Secondary Institutions* (Victoria, BC: BCcampus, 2016), https://bccampus.ca/wp-content/uploads/2016/01/BCFacultyUseOfOER_final.pdf; Jennifer Lantrip and Jacquelyn Ray, "Faculty Perceptions and Usage of OER at Oregon Community Colleges," *Community College Journal of Research and Practice* 45, no. 12 (2021), https://doi.org/10.1080/10668926.2020.1838967; Ozgur Ozdemir and Christina Hendricks, "Instructor and Student Experiences with Open Textbooks, from the California Open Online Library for Education (Cool4Ed)," *Journal of Computing in Higher Education* 29 (2017), https://doi.org/10.1007/s12528-017-9138-0.
16. Michael Chee and Kari D. Weaver, "White Paper on OER: Seven Recommendations to Improve OER Uptake in Higher Education Institutions," *UWSpace* (2022), 7, http://hdl.handle.net/10012/18167.
17. Chee and Weaver, "White Paper on OER," 4.

18. Brigitte Vézina, "Why Sharing Academic Publications Under 'No Derivatives' Licenses is Misguided," last modified April 21, 2020, https://creativecommons.org/2020/04/21/academic-publications-under-no-derivatives-licenses-is-misguided/; Cable Green, "Open Licensing and Open Education Licensing Policy," in *Open: The Philosophy and Practices that are Revolutionizing Education and Science*, eds. Rajiv S. Jhangiani and Robert Biswas-Diener (London: Ubiquity Press, 2017), 37, https://doi.org/10.5334/bbc.

Bibliography

Abeywardena, Ishan Sudeera, Dhanarajan Gajaraj, and Chee Seng Chan. "Searching and Locating OER: Barriers to the Wider Adoption of OER for Teaching in Asia." *Proceedings of the Regional Symposium on Open Educational Resources: An Asian Perspective on Policies and Practice, Penang, Malaysia* (2012).

Ashok, Apurva, and Zoe Wake Hyde. *The Rebus Guide to Publishing Open Textbooks (So Far)*. Montreal, Quebec: Rebus Community, 2019. Chap. "Roles & Responsibilities." https://press.rebus.community/the-rebus-guide-to-publishing-open-textbooks/.

BCcampus OER Production Team. *Getting Started: OER Publishing at BCcampus*. Victoria, BC: BCcampus, 2021. https://opentextbc.ca/gettingstarted/.

Bliss, TJ, T. Jared Robinson, John Hilton, and David A. Wiley. "An OER COUP: College Teacher and Student Perceptions of Open Educational Resources." *Journal of Interactive Media in Education* (2013). https://doi.org/10.5334/2013-04.

CAST. "Universal Design for Learning Guidelines version 2.2." Last modified 2018. https://udlguidelines.cast.org.

Chee, Michael, and Kari D. Weaver. "White Paper on OER: Seven Recommendations to Improve OER Uptake in Higher Education Institutions." UWSpace. 2022. http://hdl.handle.net/10012/18167.

Chimbo, Bryan, Paola Ingavélez-Guerra, and Salvador Otón-Tortosa. "Accessibility Metadata: A Proposal for the OER's Evaluation Considering Quality Models." In *2021 IEEE Fifth Ecuador Technical Chapters Meeting (ETCM)*, edited by Mónica Karel Huerta, Sebastián Quevedo, and Carlos Monsalve. Cuenca: IEEE, 2021. https://doi.org/10.1109/ETCM53643.2021.9590799.

Delimont, Nicole, Elizabeth C. Turtle, Andrew Bennett, Koushik Adhikari, and Brian L. Lindshield. "University Students and Faculty Have Positive Perceptions of Open/Alternative Resources and Their Utilization in a Textbook Replacement Initiative." *Research in Learning Technology* 24 (2016). https://doi.org/10.3402/rlt.v24.29920.

Diaz, Chris. "A Production Workflow for OER Projects." Last modified May 2020. https://www.northwestern.edu/open-educational-resources/docs/oer-production-workflow.pdf.

Dolan, Robert P., and Kim Ducharme. "Adaptivity in the Wild: Individualizing Reading Supports in Open Learning Scenarios." *Innovations in Learning and Technology for the Workplace and Higher Education Proceedings of 'The Learning Ideas Conference' 2021*, edited by David Guralnick, Michael E. Auer, and Antonella Poce, 352–63. Switzerland: Springer, 2022. https://doi.org/10.1007/978-3-030-90677-1.

Elder, Abbey. *The OER Starter Kit*. Iowa: Iowa State University Digital Press, 2019. Chap. "Planning and Completing Your OER Project." https://iastate.pressbooks.pub/oerstarterkit/.

Forgie, Jemma. *University of Alberta OER Starter Kit*. Alberta: University of Alberta Library, 2019. Chap. "Planning and Completing Your OER Project." https://openeducationalberta.ca/oerstarterkit/.

Gong, Regina. "Production of OER Workflow." Last modified September 2020. https://www.oercommons.org/courseware/lesson/78283/overview?section=1.

Green, Cable. "Open Licensing and Open Education Licensing Policy." In *Open: The Philosophy and Practices that are Revolutionizing Education and Science*, edited by Rajiv S. Jhangiani and Robert Biswas-Diener, 29–41. London: Ubiquity Press, 2017. https://doi.org/10.5334/bbc.

Iniesto, Francisco. "An Investigation into the Accessibility of Massive Open Online Courses (MOOCs)." PhD diss., The Open University, 2019. http://dx.doi.org/10.21954/ou.ro.0001117a.

Iniesto, Francisco, Bernardo Tabuenca, Covadonga Rodrigo, and Edmundo Tovar. "Challenges to Achieving a More Inclusive and Sustainable Open Education." *Journal of Interactive Media in Education* (2021). http://doi.org/10.5334/jime.679.

Jhangiani, Rajiv S., Rebecca Pitt, Christina Hendricks, Jessie Key, and Clint Lalonde. *Exploring Faculty Use of Open Educational Resources at British Columbia Post-Secondary Institutions*. Victoria, BC: BCcampus, 2016. https://bccampus.ca/wp-content/uploads/2016/01/BCFacultyUseOfOER_final.pdf.

Lantrip, Jennifer, and Jacquelyn Ray. "Faculty Perceptions and Usage of OER at Oregon Community Colleges." *Community College Journal of Research and Practice* 45, no. 12 (2021): 896–910. https://doi.org/10.1080/10668926.2020.1838967.

Martins, Valéria Farinazzo, Cibelle Amato, Łukasz Tomczyk, Solomon Sunday Oyelere, Maria Amelia Eliseo, and Ismar Frango Silveira. "Accessibility Recommendations for Open Educational Resources for People with Learning Disabilities." In *Trends and Innovations in Information Systems and Technologies*. Vol. 3, edited by Álvaro Rocha, Hojjat Adeli, Luís Paulo Reis, Sandra Costanzo, Irena Orovic, and Fernando Moreira, 387–96. Switzerland: Springer, 2020. https://doi.org/10.1007/978-3-030-45697-9.

Meinke, Billy. "An OER Production Workflow for Faculty." Last modified February 2017. https://oer.hawaii.edu/an-oer-production-workflow-for-faculty/.

Morrison, Gary R., Steven M. Ross, Howard K. Kalman, and Jerrold E. Kemp. *Designing Effective Instruction*. 7th ed. Hoboken: Wiley, 2013.

Nikoi, Samuel K., Tania Rowlett, Alejandro Armellini, and Gabi Witthaus. "CORRE: A Framework for Evaluating and Transforming Teaching Materials into Open Educational Resources." *Open Learning: The Journal of Open, Distance and e-Learning* 26, no. 3 (2011): 191–207. https://doi.org/10.1080/02680513.2011.611681.

OPUS. "Open Textbook Publishing Workflow." Accessed April 29, 2022. https://www.kpu.ca/sites/default/files/Library/Open%20Textbook%20Publishing%20Workflow%20v%204.0.pdf.

Ozdemir, Ozgur, and Christina Hendricks. "Instructor and Student Experiences with Open Textbooks, from the California Open Online Library for Education (Cool4Ed)." *Journal of Computing in Higher Education* 29 (2017): 98–113. https://doi.org/10.1007/s12528-017-9138-0.

Palloff, Rena M., and Keith Pratt. *Assessing the Online Learner: Resources and Strategies for Faculty*. San Francisco: Jossey-Bass, 2009.

Peuler, Mollie, and Mark Coltrain. "Flip this House!: Updating and Designing an Online First Year Seminar Module Series." *Journal of Library & Information Services in Distance Learning* 14, nos. 3-4 (2020): 253–65. https://doi.org/10.1080/1533290X.2021.1880527.

Rao, Kavita. "Inclusive Instructional Design: Applying UDL to Online Learning." *The Journal of Applied Instructional Design* 10, no. 1 (2021). https://dx.doi.org/10.51869/101/kr.

Ren, Xinyue. "The Undefined Figure: Instructional Designers in the Open Educational Resource (OER) Movement in Higher Education." *Education and Information Technologies* 24, no. 6 (2019): 3483–3500. https://doi.org/10.1007/s10639-019-09940-0.

Rogers, Lisa. "OER Workflow Diagram." Last modified November 16, 2009. https://cccoer.wordpress.com/2009/11/16/oer-workflow-diagram/.

Schmidt, Aaron, and Amanda Etches. *Useful, Usable, Desirable: Applying User Experience Design to Your Library*. Chicago: American Library Association, 2014.

Vézina, Brigitte. "Why Sharing Academic Publications Under 'No Derivatives' Licenses is Misguided." Last modified April 21, 2020. https://creativecommons.org/2020/04/21/academic-publications-under-no-derivatives-licenses-is-misguided/.

Wiley, David. "The Access Compromise and the 5th R." Last modified March 5, 2014. https://opencontent.org/blog/archives/3221.