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Embedding Metaliteracy in Learning Design to Advance Metacognitive Thinking: From OER to MOOCs

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Abstract: Metaliteracy is an essential literacy for today's complex and oftentimes deceptive information environment. The origins of the metaliteracy model emerged in response to revolutionary changes in a connected world and the need to reconceptualize information literacy for a broader impact on learning. The theory of metaliteracy involves the intersection of core components that include learner domains, active learner roles, characteristics or qualities, and associated goals and learning objectives. This model is applied when individuals engage with and reflect upon these components to realize their active responsibilities as participants in social settings. This paper describes several examples of how metaliteracy is embedded in teaching praxis through open educational resources (OER) that include interactive learning objects and digital badging content as well as fully developed Massive Open Online Courses (MOOCs). Specifically, these metaliteracy OER have been applied by the authors in an information literacy course at the University at Albany, SUNY, as well as online courses in the Digital Arts at SUNY Empire State College. Although this descriptive approach is limited, it demonstrates the potential for future research into the impact of metaliteracy theory and practice on student's perceived learning.

Keywords*: Metaliteracy, Post-Truth, Metacognition, Pedagogy, Learning Design*

1 Introduction

Metaliteracy is a pedagogical framework to actively engage learners as informed researchers and ethical producers in participatory information environments [1-2]. This comprehensive model is designed to prepare metaliterate learners who mindfully contribute to collaborative communities. Metaliteracy integrates an essential metacognitive dimension with affective, behavioral, and cognitive domains. This unified learning theory encourages metacognitive awareness and critical thinking. Individuals are encouraged to develop a metaliteracy mindset that prepares them to interact and contribute effectively to a connected world. They take charge of their learning while adapting to social settings to produce information in multiple modes and emerging formats. Metaliteracy instructional materials are available as open educational resources (OER) to support this approach from different disciplinary perspectives and to apply it in disparate learning activities, courses, and programs.

2 Metaliteracy

2.1 Recasting Information Literacy as a Metaliteracy

Metaliteracy is a vital literacy that was initially envisioned to reframe and reinvent outdated views of information literacy, such as the ACRL Information Literacy Competency Standards for Higher Education [1-3]. The metaliteracy framework was proposed to reimagine information literacy because it "incorporates a metacognitive perspective, encouraging learners to think about their own thinking and to continuously reflect on their experiences" in evolving information environments [4, p.85]. As originally introduced: "Metaliteracy expands the scope of information literacy as more than a set of discrete skills, challenging us to rethink information literacy as active knowledge production and distribution in collaborative online communities" [1, p.64]. Through this recasting of information literacy, an expanded metaliteracy model emphasizes both reflective learning and critical thinking as individuals produce and share information in social settings. Metaliteracy influenced the design of the *ACRL Framework for Information Literacy for Higher Education*, which was similarly focused on a broader conception of information literacy beyond the standards-based approach. The revised definition of information literacy in the ACRL *Framework* demonstrates an alignment with metaliteracy:

> Information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning [5].

Compared to metaliteracy, this expanded definition of information literacy emphasizes a rethinking of the concept with a particular focus on producing information and creating knowledge in collaborative and participatory communities. At the same time, however, the critical consideration of metacognition, which is central to metaliteracy, was ultimately diminished in the final draft document, culminating in a clear distinction between the two frameworks [6].

A primary difference between metaliteracy and the ACRL *Framework* is where the emphasis lies. As seen clearly in Figure 1, the heart of metaliteracy is the learner. Core elements of metaliteracy are the learning domains, learner roles, and learner characteristics. The way an individual learns, the roles they make their own, and the characteristics they demonstrate or aspire to are central to this approach. The ACRL *Framework*, on the other hand, places information at the center of the model. Examples are the frames *Information Creation as a Process* and *Information Has Value*, as is evident from the concept names. Individuals must understand and engage with information accordingly, but the emphasis is placed on the concepts to be mastered.

The British library and information association CILIP developed a new information literacy definition in 2018:

> Information literacy is the ability to think critically and make balanced judgements about any information we find and use. It empowers us as citizens to develop informed views and to engage fully with society [7].

As with the ACRL *Framework*, this definition is supported by an extensive exploration of what information literacy is. It provides glimpses into the application of information literacy in everyday life, citizenship, education, the workplace and health. As with metaliteracy, CILIP's definition focuses on the individual, though it hones in on what an individual knows how to do. Viewed through the prism of metaliteracy's learning domains, it supports the cognitive and the behavioral.

All three frameworks have strengths. ACRL's definition places information literacy solidly within academic discourse, although its value extends beyond that setting. CILIP's supporting documentation clearly demonstrates the value of information literacy in all aspects of life. Metaliteracy's expansive conception views the individual through the lifelong pursuit of learning and engagement in connection with, and beyond, information. Metaliteracy's emphasis on the importance of metacognition is singular. The ACRL *Framework* relied upon metaliteracy's emphasis on this learning domain. CILIP's definition is primarily focused on informed evaluation but does include several allusions to metacognition. Information literacy "concerns the application of the competencies, attributes, and confidence needed to make the best use of information and to interpret it judiciously" [7]. Beyond this statement and a segment in the Everyday Life section about mindfulness and information sharing, metacognition appears, without being named, in the section Information Literacy and Citizenship:

> IL allows individuals to acquire and develop their understanding of the world around them; to reach informed views; where appropriate, to challenge, credibly and in an informed way assumptions or orthodoxies (including one's own), and even authority; to recognise bias and misinformation; and thereby to be engaged citizens, able to play a full part in democratic life and society [7].

The original conception of metaliteracy remains distinct in its approach to learners in the information environment, despite the newer definitions of information literacy. Metaliteracy is unique because it concentrates on roles and characteristics, some of which are aspirational, but all of which are attainable.

2.2 Post-Truth World

Metaliteracy is especially relevant in a post-truth world that exemplified by misinformation and breaches of trust by proprietary social media platforms. According to *Oxford Languages* the term "*Post-truth* is an adjective defined as 'relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief'" [8]. In a post-truth world, scientific reasoning and critical thinking are displaced by personal or political beliefs that are shared among members of like-minded communities. In his meditation on the meaning of truth in his essay *The Watergate Syndrome*: *A Government of Lies*, Steve Tesich uses the term "post-truth" to argue that people choose to believe the lies of their political leaders because it is easier than accepting the truth [9, p.13]. The term post-truth remerged in response to the 2016 presidential election in the United States and the Brexit movement in the United Kingdom to describe political and partisan divisions that challenge an agreed upon understanding of truth and reason [8].

The privacy practices of proprietary social media contribute to post-truth circumstances. Facebook's unauthorized sharing of user information with the data analytics firm Cambridge Analytica, for instance, became emblematic of

these concerns [10]. Similarly, the power of algorithms used in social media and online sites to collect user data and reinforce searching behaviors has raised questions about the influence of these systems on how students perceive news and information sources [11].

Political and partisan differences are pronounced during the COVID-19 global pandemic as disinformation about the crisis impedes attempts to address the prevention and treatment of the virus. The World Health Organization introduced the term "infodemic" to describe the mis- and disinformation that emerges as part of this global pandemic [12]. In a joint statement with several international organizations, the WHO argues that "the technology we rely on to keep connected and informed is enabling and amplifying an infodemic that continues to undermine the global response and jeopardizes measures to control the pandemic" [12]. Globally, the infodemic is epitomized by political and partisan divisions as well as personal beliefs that question such life-saving techniques as mask-wearing, social distancing requirements, and the use of vaccines.

2.3 Metaliteracy in a Post-Truth World

The post-truth world has raised challenges to truth and reason that require more than discrete skills to prepare learners to effectively learn and contribute positively to social information environments. Metaliteracy addresses these concerns by supporting metacognitive reflection and a deeper understanding of affective responses to information. This integrated model provides a multi-faceted approach to learning that supports learners in dealing with the challenges of post-truth circumstances [13]. Several examples of metaliteracy in practice show the potential for applying this comprehensive approach to teaching and learning [14]. For instance, Josh Compton argues that inoculation theory should be taught with metaliteracy to support learners in building resistance to a post-truth world [15]. Metaliteracy is examined in relation to scientific literacy to effectively engage students in science education during the post-truth era [16]. In another example, Nicole Cooke argues for metaliteracy as a long-term pedagogical strategy to prepare students to think critically about the mis- and disinformation that is prevalent online [17].

3 The Core Components of Metaliteracy

Metaliteracy involves the intersection among four core components that define this approach in practice. The metaliteracy model (Figure 1) shows the metaliterate learner at the center of three concentric circles or rings that illustrate the learning domains, characteristics, and active learner roles. Each of these components is reinforced by the metaliteracy goals and learning objectives that define flexible strategies for teachers and learners to adapt and apply in different pedagogical settings.

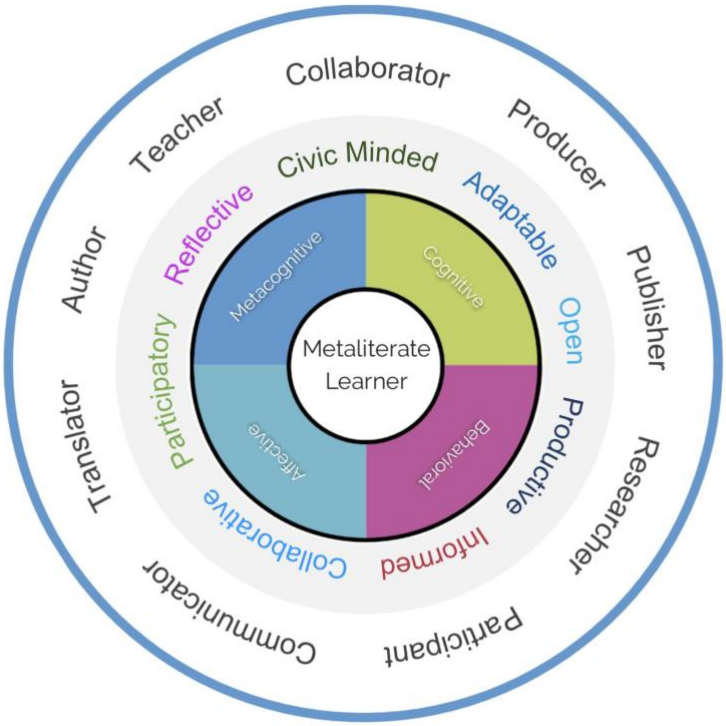

Figure 1: Metaliteracy Model (Mackey & Jacobson, 2021) (Figure design by Kelsey O'Brien using Genially)

3.1 Learning Domains

Metaliteracy emphasizes the relationship among four domains of metaliterate learning, including the affective, behavioral, cognitive, and metacognitive. The two learning domains most frequently encountered in education, whether formal or informal, are the cognitive and the behavioral. The emphasis is on what one knows after learning, and what one is able to do. Indeed, most stated learning objectives focus on these two domains. The affective and the metacognitive often are not considered, and yet they have a significant impact on learning. Interestingly, their value is often immediately recognized by learners when they are introduced to these additional learning domains. Individuals who consciously reflect on how they think and feel about information and associated environments are primed to gain critical insights. These may involve submerged mental barriers or feelings of inadequacy in connection with learning particular subjects or assuming specific metaliterate roles (affective), or the recognition that monitoring one's learning needs and assumptions can lead to valuable insights. Together, the affective and metacognitive domains are powerful tools that can marshal revelations about their own cognitive biases. Learners may also become aware of the deceptive qualities of constructed media and how their emotions may be targeted through manipulated content.

3.2 Learner Roles and Characteristics

Metaliterate learners understand how to create and share truthful and trusted information through active roles they identify and develop, such as producer, researcher, and teacher. The metaliterate learner roles allow students to situate their learning within specific contexts while imagining new or expanded responsibilities to strive toward. The identification and categorization of potential roles provide coherency and direction to what learners might otherwise see as fragmented actions. It introduces the metacognitive learning domain by asking that individuals reflect on how the individual behaviors adhere and form something of substance, something that they can monitor and enhance.

Metaliterate learners do not just consider how they might achieve a specific objective, but instead relate it to an active role they are playing or could play as part of a reflective process. For instance, as learners see themselves as researchers and producers of information, they also reflect on and critically evaluate their biases and the bias that may be embedded in information sources. In addition, as learners recognize how they are collaborators and participants in social settings, they gain a deeper understanding of the related role they play as a teacher, by sharing and co-creating knowledge with their peers. Once introduced to the metaliteracy roles, learners quickly recognize that they are indeed taking them on and note that much of what they do encompasses overlapping roles.

As metaliterate learners expand upon and realize a set of interrelated roles for producing and sharing information, they also strive toward several characteristics or qualities that reinforce these practices. Each of the metaliterate learner characteristics relates to the roles and demonstrates active and reflective learning. Being *productive* aligns directly with the producer role as learners develop original content through writing, planning, and the creation of essays, artworks, performances, digital artifacts or multimedia presentations. They understand the responsibilities associated with intellectual property and differentiate between copyright and openly licensed materials available through the Creative Commons. Producing new knowledge involves being *informed* as an active researcher who applies objective and scientific reasoning to make new discoveries and to contribute in meaningful ways through writing and digital media formats. The *informed* characteristic reinforces multiple roles such as researcher, communicator, and teacher, while being influenced by these practices in social learning communities.

Metaliteracy involves the ethical considerations of content creation as individuals and with co-producers in collaborative settings. This active process requires learners to practice the role of communicator and collaborator and to strive toward the *collaborative* characteristic. Being in a connected community does not automatically prepare individuals to build effective partnerships for creating new knowledge, but it does provide a space to learn how to do so. As individuals develop a metaliteracy mindset and practice collaborative roles, they will gain new experience and insights for working together and problem-solving as a team. This approach is closely connected to the *participatory* characteristic, which reinforces the participant role in social settings. Being participatory recognizes the interactivity of social settings that rely on the knowledgeable contributions of everyone in the community.

As metaliterate learners apply metacognitive thinking, they work toward the *reflective* characteristic, which influences all of the active learner roles they put into practice. Being reflective provides insights about being an author of information as individuals contemplate their thinking process through writing, journaling, performing, podcasting, or presenting with digital media. As individuals gain a metaliteracy mindset they take charge of their learning in a way that impacts the perception of their own abilities through practice. As reflective metaliterate learners, for instance individuals see themselves in roles such as producer or teacher that they may not have envisioned previously. By

reflecting on the knowledge, they share with their peers in collaborative settings, they gain new insights about how they teach someone else what they know.

The *open* characteristic has multiple meanings as metaliterate learners show their openness and flexibility to new life experiences and learning situations. They are transparent about what they know and identify areas for continued growth in their learning. Being open reinforces the collaborator role as learners demonstrate the willingness to work effectively with peers to solve problems and to create meaning in social settings. It also supports being a communicator as individuals practice transparency in producing and sharing ideas within a group and for external audiences. The open characteristic intentionally calls to mind open learning and OER in relation to metaliteracy content created for and by learners in collaborative settings.

As individuals engage with other participants in social environments, they will inevitably encounter new approaches to learning and associated technologies or techniques for producing information. These evolving situations require the *adaptive* characteristic to continuously adjust to different circumstances and emerging technologies. Being adaptive supports several of the active learner roles such as researcher since this responsibility requires critical engagement with authors, editors, and experts through a vast array of evolving documents and source types. The adaptive characteristic supports the translator of information who translates or adapts ideas from one artistic or literary form of expression to another. This process involves adapting to emerging technologies such as virtual environments or social media while also asking questions about the systems themselves. For instance, this critical appraisal of technology may involve studying the algorithms that drive social systems or the powers that support proprietary social media. The knowledge gained from these critical insights will prepare individuals to explore and adapt to changing technologies with confidence while being aware of how their own data is collected and shared.

The metaliteracy model places an emphasis on collaboration and the social contexts for learning. The *civic-minded* characteristic reinforces individual responsibility within connected communities including the contributions people make to these settings as producers and participants. Being civic-minded means that individuals will make ethical choices about how to interact while being mindful of what they create and distribute in social spaces. They will support community standards for engagement and produce content that makes a meaningful contribution to the dialogue in these settings. The civic-minded characteristic is essential for metaliterate learning because it supports the active roles of the individual while strengthening the responsibilities one has to their community.

3.3 Metaliteracy Goals and Learning Objectives

The metaliteracy model is reinforced through the application of the metaliteracy goals and learning objectives. These interrelated outcomes are adaptable to different disciplines and pedagogical situations and settings. To date, this flexible resource has been translated into six different languages including Afrikaans, French, Italian, Portuguese, Setswana, and Spanish. These translations expand the potential audience for this approach while diversifying the application of the outcomes in practice

The Metaliteracy Goals and Learning Objectives feature four primary goals that are associated with several objectives. The four key goals include the following:

Goal 1: Actively evaluate content while also evaluating one's own biases
Goal 2: Engage with all intellectual property ethically and responsibly
Goal 3: Produce and share information in collaborative and participatory environments
Goal 4: Develop learning strategies to meet lifelong personal and professional goals [18].

The metaliteracy goals and learning objectives integrate the core components of this unified model. The learning objectives are informed by the learning domains and each one is identified as affective, behavioral, cognitive, and/or metacognitive. Metaliterate learners achieve these outcomes by playing active roles and striving toward the related characteristics. The first goal, "Actively evaluate content while also evaluating one's own biases," is associated with several learning objectives including an affective and cognitive outcome about expertise [18]. Learners are prepared to verify expertise in the information they research while acknowledging that experts and expertise actually exists. This is a valuable objective in a post-truth world where everyone may consider themselves an expert without editorial mechanisms to affirm such claims. In the second goal of metaliteracy, "Engage with all intellectual property ethically and responsibly," is reinforced by several related objectives [18]. In one example that involves the affective and metacognitive domains, learners are encouraged to be excited about building on the ideas of others while developing ethical and original approaches for doing so. This outcome captures the excitement of remixing content to produce novel work while understanding the ethical responsibilities of repurposing and creating information.

The third goal of metaliteracy encourages learners to "Produce and share information in collaborative and participatory environments" [18]. This pivotal aim of the model is reinforced by several objectives including one that encompasses the affective and metacognitive domains because it asks learners to reflect on how they see themselves in the producer role. Students may not envision themselves in this role until they are encouraged to reflect on how they feel about their own responsibilities as a producer. The fourth goal of metaliteracy emphasizes the potentially long-term influence of metaliteracy as learners are asked to "Develop learning strategies to meet lifelong personal and professional goals" [18]. One of several objectives combines the behavioral and metacognitive domain because it supports individuals in engaging in social information environments as self-directed and informed learners to expand their worldview. This outcome considers the potential of a connected world to unite people in a positive and productive way rather than divide people and communities.

These four goals and associated learning objectives support the application of the metaliteracy model in practice. They define the specific aims and outcomes that assist individuals as they become metaliterate learners. This approach is flexible and adaptable to different pedagogical settings. As we will see in the next section, metaliteracy has been embedded in different learning activities and courses that model ways to apply it in practice. A number of open educational resources (OERs) are thus available for teaching these concepts or by pursuing independently as a self-directed lifelong learner.

4 Embedding Metaliteracy in Practice

The practice of integrating metaliteracy in the design of open resources is intended to reinforce metacognitive learning in support of critical inquiry and informed participation. The Metaliteracy Learning Collaborative, a research team from Empire State College and The University at Albany, both from the State University of New York (SUNY), have developed MOOCs, videos, a complex badging system, a robust metaliteracy module within an online first-year course, and related tools and techniques. These resources are flexible and adaptable as needed for a variety of teaching and learning situations. In addition, pre-existing open resources that are not metaliteracy-specific may be incorporated as the basis for developing an integrated instructional segment or course intertwined with metaliteracy either as core content or scaffolding.

Examples of both scenarios are found in this section, with a focus on a range of open resources and their value for teaching metaliteracy. Insights and observations from the authors are included to provide a preliminary assessment of how the metaliteracy OER informed praxis in these distinct pedagogical settings.

4.1 Teaching with a Post-Truth MOOC

The Metaliteracy Learning Collaborative has been involved in developing metaliteracy content for several Massive Open Online Courses (MOOCs) in different formats and platforms, including the cMOOC or connectivist model, as well as xMOOC approach found in Coursera and Canvas [19]. A descriptive analysis of all three metaliteracy MOOCs that primarily explored design elements found that "MOOC pedagogy must not only enable student agency, but also support students as they take on more active roles as participants, contributors and teachers" [19, p.284]. Metaliteracy provides a pedagogical model that is designed to reinforce self-directed learning in these open environments. The application of metaliteracy in MOOCs provides the "potential to convey not just content, but the learning opportunities that enable the formation of metaliterate practices and knowledge" [19, p.284]. Based on a descriptive analysis of these resources that explored the advantages and disadvantages of cMOOCs and xMOOCs, members of the Metaliteracy Learning Collaborative argued for "a hybrid Metaliteracy MOOC that would focus less on the lectures found in xMOOCs, and more on user-generated content, collaborative knowledge creation, and student-driven learning promoted in cMOOCs, while supporting learners as teachers and contributors to the course" [19, p.284]. This assertion led to a grant-funded project to design a global MOOC, Empowering Yourself in a Post-Truth World in the Open EdX platform. This post-truth MOOC embeds metaliteracy through the development of interactive learning objects, dynamic video content, readings and resources, learning objectives adapted from the Metaliteracy Goals and Learning Objectives, and a final assignment that requires the development of an original digital artifact.

The post-truth MOOC does not fully integrate the cMOOC and xMOOC methodologies as originally intended, since Open EdX is an xMOOC platform that ultimately presents limits in design functionality. At the same time, however, approaching this project based on the experience of developing both connectivist and xMOOCs did impact many of the design decisions. The post-truth MOOC provides an interactive space for learner engagement about this timely topic and encourages learners to produce digital content as part of a final project [20]. The exploration of post-truth through the lens of metaliteracy initiates a central theme related to *building communities of trust* in divided information environments [21]. The concept of a community of trust reflects the collaborative and participatory dimension of metaliteracy while supporting the civic-minded characteristic. The development of the post-truth MOOC in Open edX generated several metaliteracy OER that are available at the Metaliteracy YouTube channel and Metaliteracy.org blog.

The Open edX MOOC became a central resource for the design of an online metaliteracy course in Moodle for undergraduate and graduate students at SUNY Empire State College to pursue as a for-credit option. The course design in Moodle features additional readings, online resources, and learning activities that complement the materials in post-truth MOOC. The content in Moodle is linked to related modules in the Open edX platform to create thematic associations between both environments. Rather than ask students to simply register for the MOOC to earn credit, the Moodle course provides a contextual entry point to this space with two weeks of investigation into what a MOOC is and how the format evolved from connectivist approaches to xMOOCs. As the course progresses, they study topics that relate to the MOOC, such as the origins of the term post-truth, building communities of trust, metaliteracy and metaliterate learning, misinformation and the future of truth, as well as the connected and post-truth world. The course closes with discussions about the advantages and disadvantages of MOOCs and provides students with the chance to reflect on participating in a post-truth MOOC. The final MOOC assignment to create a digital artifact is expanded in Moodle to include additional insight and opportunities for reflection on this project through a discussion with peers.

Throughout the online course in Moodle, metaliteracy is applied as a flexible model, demonstrating how it can be used in learning environments to spark student reflection on post-truth issues as well as metaliterate learner roles and responsibilities. Students apply metaliteracy by envisioning their metaliterate learner roles and reflecting on the process of engaging in the global MOOC. This for-credit course shows how the MOOC itself is an adaptable resource for teaching and learning.

The openness of the MOOC format and associated OER allowed for a revision of the original Open EdX version of the class in Coursera (https://www.coursera.org/learn/empowering-yourself-post-truth-world) to reach a wider audience and to pair it with another metaliteracy MOOC in Coursera, Empowering Yourself in a Connected World (https://www.coursera.org/learn/metaliteracy).

4.2 Integrating Metaliteracy into an Ethics Course in the Digital Arts

The design of the post-truth MOOC in Open edX and Coursera generated several OER that are adaptable to courses about topics that extend beyond the study of post-truth and/or metaliteracy. In one specific example at SUNY Empire State College, themes and resources originally developed for the MOOC informed the development of an undergraduate course for the Department of Arts and Media entitled Ethics of Digital Art & Design.

The modules for this class reflect several core themes, including Ethics in the Digital Arts, Digital Photography and Digital Identity, Ethics of Selfies and Self-Portraits, Altered Images in a Post-Truth World, Deep Fake Video in a Post-Truth World, and Augmented and Virtual Realities. Through the context of this course, students investigate the deceptive aspects of digital images and deep fake videos in relation to digital art and photojournalism and within the context of a post-truth society. The design of the course reflects the post-truth themes from the MOOC and introduces the metaliteracy model and the concept of building communities of trust.

In addition to the Moodle environment, students establish a profile in Linkr Education which is a course-specific space outside of the Learning Management System (LMS). As the semester progresses, students produce several multimedia publications that involve a written essay and the creation of digital images and/or digital video. Through the Linkr assignments, students examine all of the course themes, including the challenges of a post-truth society and building communities of trust. Rather than explore the post-truth society as a central topic of study, it is examined within the context of digital manipulation in the arts and photojournalism. This approach shows how these issues permeate a wide range of societal concerns. As students engage with these topics and develop their multimedia publications, they expand their roles as producers, communicators, and publishers of information while considering the ethical dimension of creating content in a post-truth world.

The post-truth themes originally developed for the MOOC influenced the design of the ethics course in the digital arts. In this context, metaliteracy engages students in a process of self-reflection about their own learning as they envision themselves as reflective and empowered producers of information. This approach reinforces the ability to solve problems in a divided information environment while investigating ethical issues in the digital arts.

4.3 Developing the Lumen Learning iSucceed Learning Module

Lumen Learning's College Success course (https://courses.lumenlearning.com/collegesuccess-lumen/) is composed of eight interactive online modules pertinent for new college students. The Metaliteracy Learning Collaborative created a metaliteracy module for SUNY's iSucceed College Success expanded adaptation of Lumen's course (https://oer.suny.edu/courses/isucceed-college-success/). The five sections in this module are: Introduction to Metaliteracy; Metaliterate Research; Metaliterate Producer and Collaborator; Metaliterate Digital Citizen; and Lifelong Metaliterate Learner and provides an introduction to the core metaliteracy goals and components of the model. The content and assignments are customizable for a variety of learning scenarios. The entire iSucceed course, including the metaliteracy module, is openly available as a text version. For those institutions affiliated with Lumen, the content is also offered as a textbook and on a rich, interactive platform that can be imported into a learning management system. While some first-year courses might use and adapt the entire suite of modules within the resource, it is possible for those interested in metaliteracy to use this flexible single unit within a course.

The development of the module *Metaliterate Producer and Collaborator* reinforces the learner as producer role of metaliteracy and is informed by the process of planning and producing original digital narratives. According to Bryan Alexander, digital storytelling "is telling stories with digital technologies. Digital stories are narratives built from the stuff of cyberculture." [22, p.3]. This inventive format embodies the kind of original productions that are ideal for metaliterate learners to create as producers of information. The Lumen Learning module defines the term, provides resources to study digital storytelling, including examples of this format, and links to digital tools for producing and publishing narratives. The module features a metaliteracy video entitled *Telling Your Digital Story* (https://youtu.be/PIH9NvDwrP0) written and edited by members of the Metaliteracy Learning Collaborative and produced by Kelsey O'Brien. The video is effective because it explains how to produce a digital story while describing this process through key components of the metaliteracy model. It illustrates the value and flexibility of OER as adaptable materials in multiple instructional settings. In addition to being a centerpiece of this module, the video has also been embedded in the Coursera MOOC Empowering Yourself in a Connected World and an online Digital Storytelling course at SUNY Empire State College. As an open resource, the video is available at the Metaliteracy YouTube channel for adaptation beyond these settings as well.

4.4 Metaliteracy as Scaffolding for Wikipedia Editing

Metaliterate learners strive to be informed and ethical producers of information in participatory online environments. One of the most well-known sites where it is possible to openly contribute in a significant manner is Wikipedia. It is an influential global source for people throughout the world to get information. Its prominence in Google search results further emphasizes the importance of its content, and it is vital that this content reflect topics representative of its readership [23, p.512]. It is an ideal platform for learners to flex their muscles as a producer. Beyond enhancing their metaliteracy, new editors help to address gender and racial imbalances in its content. Yet new Wikipedia editors often find it daunting to join this community that at times seems to speak its own language and is not always completely welcoming to novice editors. Add to this the anxiety of contributing content that will potentially be scrutinized by thousands of people, and it is clear that scaffolding is needed for new contributors. Metaliteracy provides ideal scaffolding for such a learning environment. Thinking about oneself in metaliterate roles such as researcher, author, and producer of information, as well as acknowledging the affective learning domain, provides support as individuals go through the process of learning to edit. It encourages learners to enlarge their conception of their abilities.

In an information literacy course at the University at Albany, SUNY that attracts juniors and seniors, students are asked to use their emerging expertise in their major field of study to enhance an existing Wikipedia article. They are encouraged to select an article in which they may be able to address imbalances of coverage. The class uses the tools provided by the Wiki Education program (https://wikiedu.org/). However, the course starts with overviews of information literacy and metaliteracy, and then examines the ACRL information literacy frame, *Information Has Value*, including the idea of representation in Wikipedia. From weeks three to seven, students intertwine information literacy, metaliteracy, and Wikipedia editing, which has proved to provide a powerful learning experience. The potentially global review process helps to ensure that, contrary to assumptions, much of the information on Wikipedia is scrupulously referenced and vetted. Once these students understand the rigor involved, they adhere to the same standards, and take pride in the work that they are doing.

Metaliteracy helps to empower learners with the agency that they need in order to feel comfortable editing Wikipedia. As one student, Devin Ogden, wrote about his experience in the spring 2021 section of the course,

> By being aware of myself as a learner, I was able to look outside of myself as just a student and see that I am also a researcher, a participant, a translator, teacher and producer of information. As a result, I was more aware of what my roles were and how I learn and was able to comprehend things easier.

The combination of learning about metaliteracy and Wikipedia editing has the potential for these learners to contribute their service to an initiative that is a positive and generally very accurate source of information for individuals, some of whom have minimal or no other access to information of this kind, information backed by solid, researched sources. In a post-truth world, access to this type of material is imperative.

This approach to engaging students in non-disposable assignments provides a powerful learning experience that can be adapted to any discipline. It is important to recognize that they are being asked to provide evidence of their learning in a very public way, and to provide the support and resources that will enable learners to succeed. Introducing them to metaliteracy is a strong first step.

5 Conclusion

This paper introduces readers to the metaliteracy framework and its nexus of components. Although those new to metaliteracy may be unfamiliar with all of the learning domains, roles, and characteristics involved, these concepts are very pertinent to them. Based on the experience of the authors, learners who discover domains, roles, or characteristics they had not considered before will find their new awareness of these concepts to be powerful. In the same way, recognizing the unity of the roles and the characteristics, both within each ring on the metaliteracy figure and between rings, encourages students to examine their own mindsets and actions. Metaliteracy provides a strategic direction that is inherently valuable for individuals seeking to participate responsibly and produce ethically in today's complex, collaborative information environment. Metaliteracy's goals and learning objectives point out the rather flexible path to follow. While metaliteracy can be studied on its own, it also provides remarkable support for individuals to grow as learners and producers within disciplines. The paper includes several examples of learning situations in which existing open metaliteracy learning resources may be adapted to the need of almost any discipline, as well as a case where learning how to engage with a generic open resource provides the ideal opportunity to provide learners with scaffolding to succeed. Metacognitive reflections are, not surprisingly, a core component of the courses described. The authors encourage this practice, not only for the sake of the students' learning, but for the ongoing inspiration that emerges from the individualized testimonies of this learning.

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