5-10-2019

Developing Metaliterate Citizens: Designing and Delivering Enhanced Global Learning Opportunities

Trudi E. Jacobson
University at Albany, State University of New York, tjacobson@albany.edu

Thomas P. Mackey
SUNY Empire State College, Tom.Mackey@esc.edu

Kelsey L. O'Brien
University at Albany, State University of New York, klobrien@albany.edu

Developing Metaliterate Citizens: Designing and Delivering Enhanced Global Learning Opportunities

Trudi E. Jacobson[1[0000-0001-8444-276X]], Thomas P. Mackey[2[0000-0001-8148-9992]] and Kelsey L. O'Brien[3[0000-0001-5982-3018]]

[1] University at Albany, Albany NY, USA, 12222
tjacobson@albany.edu✉
[2] SUNY Empire State College, Latham, NY, 12211
tom.mackey@esc.edu
[3] University at Albany, Albany NY, USA, 12222
klobrien@albany.edu

Abstract. This paper explores metaliteracy, its importance in today's information environment, the impact that it has had on a major model of information literacy, and the flexible open resources that are available for incorporating it in the teaching and learning of any discipline. Metaliteracy is a pedagogical model for thinking and knowing in the open age of social technology that is both connected and divided. Metaliterate learning is advanced across academic disciplines through teaching and learning situations that support several principles of metaliteracy such as self-direction, collaboration, participation, and metacognitive thinking. Concomitantly, the design of innovative, collaborative, and open online learning environments, based on the metaliteracy goals and learning objectives, offers significant potential to develop self-directed global learners through the application of this unified and collaborative framework. Members of the Metaliteracy Learning Collaborative have created several technology-mediated resources for teaching metaliteracy, including: a digital badging system, four metaliteracy-focused MOOCs (two with wrap-around credit courses), and a forthcoming learning module for students making the transition from secondary to post-secondary education.

Keywords: Metaliteracy, Open Pedagogy, MOOCs.

1 Introduction

This paper explores metaliteracy, its importance in today's information environment, the impact that it has had on a major model of information literacy, and the flexible open resources that are available for incorporating it in the teaching and learning of any discipline.

Metaliteracy is a pedagogical model for thinking and knowing in the open age of social technology that is both connected and divided. While it originally grew from a need to address gaps in the extant American Library Association definition of information literacy, it has developed into an overarching literacy that has the potential to enable learners to grapple more effectively with today's fraught information landscape.

The creative potential for producing and sharing information in linked social communities has been challenged by the proliferation of false and misleading information in a post-truth society. Many social media applications are driven by proprietary interests and oftentimes foster partisan communities that have contributed to a lack of editorial responsibility, ambiguous notions of expertise, and highly divisive discourse. These post-truth challenges require the development of critical consumers of information who evaluate resource bias while reflecting on their own preconceptions. Furthermore, this complex and conflicted environment necessitates preparing responsible and ethical information creators and sharers of verifiable content who work together in a community of trust.

Metaliterate learning is advanced across academic disciplines through teaching and learning situations that support several principles of metaliteracy such as self-direction, collaboration, participation, and metacognitive thinking. Concomitantly, the design of innovative, collaborative, and open online learning environments, based on the metaliteracy goals and learning objectives, offers significant potential to develop self-directed global learners through the application of this unified and collaborative framework.

The Metaliteracy Learning Collaborative is a team of faculty, librarians, and instructional designers, with student contributions that has created several technology-mediated resources for teaching metaliteracy. This collaborative team of educators has further developed the metaliteracy model while building a range of open tools that support open pedagogy for applying metaliteracy, including: a digital badging system, four metaliteracy-focused MOOCs (two with wrap-around credit courses), and a forthcoming learning module for students making the transition from secondary to post-secondary education. These resources will be described in more detail later in this paper.

2 Metaliteracy

Metaliteracy is a reframing and reinvention of traditional skills-based definitions of information literacy that advances reflective and empowered approaches to teaching and learning. [11][14][16]. The *meta* prefix in metaliteracy intentionally invokes metacognition as initially defined by Flavell to encourage learners to think about their own thinking while taking charge of their learning through self-regulation [7, p. 908]. The idea of a metaliteracy is that learners continuously reflect on their own thinking and learning practices to define effective strategies for self-directed knowledge acquisition. There is also a second connotation for *meta*. Derived from the Greek, *meta* means “after.” Metaliteracy is what is needed after, or beyond, the basic literacies of reading and writing have been attained. Metaliteracy prepares individuals to be informed consumers and responsible producers of information in a variety of social communities, including, but not limited to those mediated by technology. This approach shifts the emphasis from simply searching and retrieving information to collaboratively producing and sharing it as responsible and contributing metaliterate citizens.

The evolution of information literacy is evident in the Association of College & Research Libraries' *Framework for Information Literacy for Higher Education*, the guiding document for information literacy in academic libraries in the United States. Metaliteracy was a key influence when the *Framework* was being developed; the Framework drew upon the overarching nature of metaliteracy, the learner role of producer of information, and the four learning domains, particularly metacognition [1]. Thus, metaliteracy's impact has been extensive in the realm of practice. Additionally, the influence of metaliteracy is demonstrated by citations from scholars in a range of fields. For instance, Google Scholar lists 401 citations for the initial article about metaliteracy [14], 66 for the second [11], and 136 citations for the first book on the topic [16]. These references, along with two edited books about this model provide evidence that metaliteracy is influencing the work of others. Both *Metaliteracy in Practice* and *Metaliterate Learning for the Post-Truth World* [15] feature chapter authors outside the field of Library and Information Science (LIS), demonstrating wide disciplinary interest in the metaliteracy framework.

As illustrated by the following figures, metaliteracy is an integrated model that spurs the development of the metaliterate learner through specific learner characteristics, the four domains of learning, and empowered learner roles, all reinforced and enacted through the metaliteracy goals and learning objectives.

2.1 Metaliterate Learner Characteristics

The characteristics of the metaliterate learner (Figure 1) define the essential traits that individuals possess and aspire to through metaliteracy in praxis. As metaliterate citizens in a post-truth society, individuals must be **informed** consumers who evaluate the authenticity of information and carefully investigate resource bias while reflecting on their own preconceptions. Metaliterate individuals are **collaborative** learners who understand the value of working together in social environments to achieve common goals. As active learners in social spaces, metaliterate citizens are **participatory** as thoughtful and consistent contributors to their communities while striving to reach across partisan divides. As noted previously, metaliterate learners are **reflective** in practice, thinking about their own thinking and taking charge of their own learning strategies. This meditative approach allows for new insights and the ability to identify gaps in knowledge that are addressed through self-directed initiative.

As responsible members of social environments, the metaliterate learner is **civic minded** and civically engaged to make a difference through constructive contributions to local and global communities. Since many social spaces are mediated by technologies that always change and evolve, the metaliterate learner is **adaptable** to shifting technology environments. This requires doing so in a critical way to continuously investigate the societal impacts of systems and platforms and the potentially negative or unforeseen implications for individuals and groups. Metaliterate learners are **open** to new learning situations as individuals and in collaboration with others. Metaliteracy is an open and evolving framework that advances open learning and open pedagogy to reinforce the collaborative production and sharing of new knowledge. At the center of this process is the learner as producer, the enactment of metaliteracy through the **productive** characteristic. The development of this characteristic in particular empowers metaliterate learners to take on a range of interrelated roles.

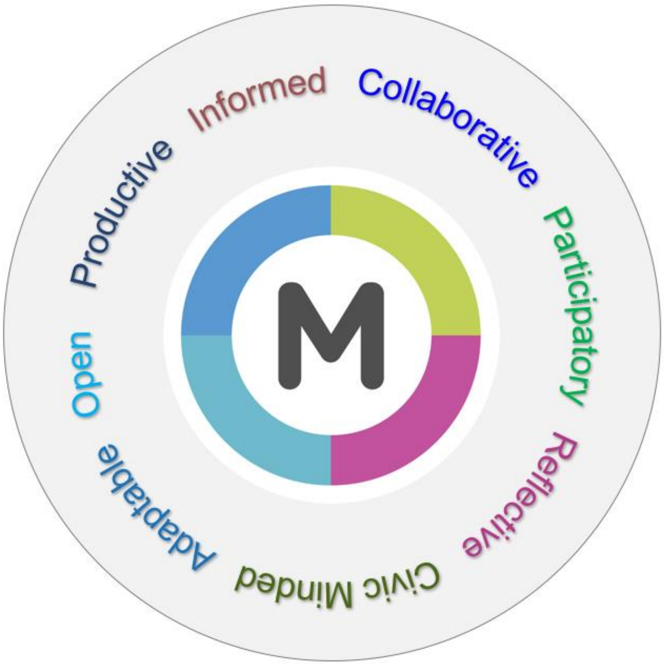

Fig. 1. Metaliterate Learner Characteristics (Source: Mackey & Jacobson 2018, p.17)

2.2 Four Domains of Metaliterate Learning

Metaliteracy's reinvention and reframing of information literacy involved thinking expansively about the learning domains essential for learners with the characteristics just described, and for them to feel empowered to take on a range of roles that emphasize the active production of information. At the point when metaliteracy was developed, information literacy emphasized the cognitive and behavioral aspects of engaging with information [8, p. 24]. Metaliteracy added two additional domains--the metacognitive, as previously mentioned, and the affective. For learners to first envisage themselves, and then actually engage in, roles that might initially seem beyond their comfort zones, they need to reflect on their abilities and their need for new knowledge or competencies in order to succeed. They also need to recognize and confront how they feel about undertaking unfamiliar roles that might involve the production or sharing of information, created either collaboratively or individually. Metaliterate learners welcome such challenges, but it is only through engaging all four domains that their open characteristic can be fully realized.

2.3 Metaliterate Learner Roles

As described in the previous section, metaliteracy provides a comprehensive view of the individual by encompassing four domains of learning that separately and in tandem inform multiple learner roles (Figure 2). While individuals may play these parts to varying degrees, the awareness gained through the application of the four domains, and related metaliteracy learning activities, enhance or develop these empowered responsibilities. For instance, metaliterate learners are active **participants** in social communities, contributing ideas and insights as part of a dialogue with others in a purposeful way. This role is enhanced by the **communicator** who emphasizes the clarity of messages sent in multiple forms and understands the impact of technology on effective communications. The metaliterate learner is a **translator** of information who interprets ideas from one mode or platform to another while adapting content from one medium to another or from one artistic or literary form to another. As **authors**, metaliterate learners are capable of writing and telling stories in multiple forms, from text, to audio, to multimedia, and combined in emerging virtual worlds.

Metaliteracy advances the idea that learners are also **teachers** and this role is evident in both formal and informal settings when individuals construct and share knowledge together. Metaliterate learners are developed as **collaborators** in social settings, prepared to define and achieve shared goals that benefit a larger community or collective. As **publishers** of information in multiple forms, metaliterate learners understand the responsibilities associated with curating relevant and reliable information and initiating editorial mechanisms that are defined and supported by a community of peers. As a unified model, these interrelated roles reinforce the metaliterate learner as a **researcher** capable of challenging assumptions while defining and developing a reasoned argument based on evidence.

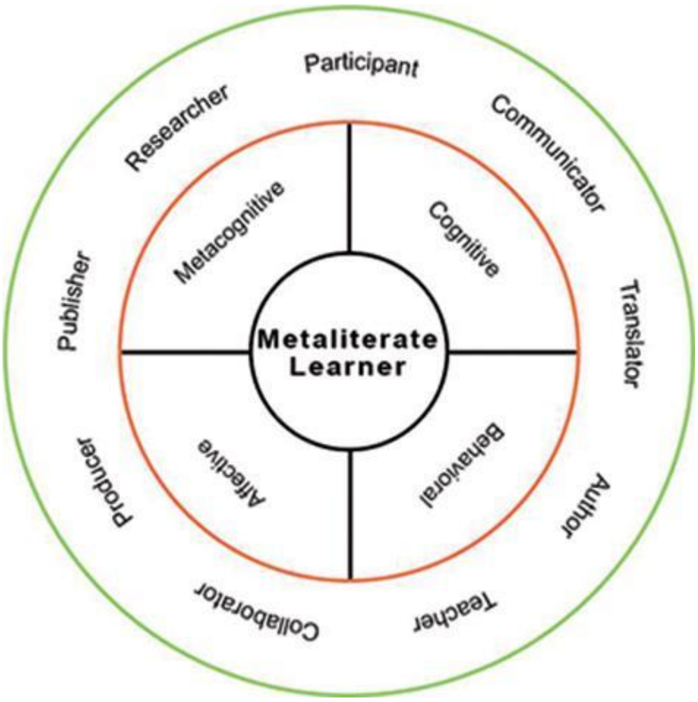

Fig. 2. The Metaliterate Learner (https://metaliteracy.org/ml-in-practice/metaliterate-learner-roles/)

2.4 Metaliteracy Goals and Learning Objectives

As individuals work toward attaining metaliterate learning characteristics and enact a range of empowering learner roles, the metaliteracy goals and learning objectives [9], informed by the learning domains, are pivotal to this ongoing pedagogical process. The metaliteracy goals and learning objectives were revised in 2018 in response to the challenges of the post-truth world. For instance, the first goal: “Actively evaluate content while also evaluating one’s own biases” addresses the concerns about confirmation bias, or seeking out information that simply supports one’s own preconceptions. This goal is supported by several specific learning objectives that require learners to acknowledge expertise and check for legitimacy in content and sources, while differentiating between opinion and fact in user-generated information.

The second goal, “Engage with all intellectual property ethically and responsibly” addresses concerns about false and misleading information and the responsibility of individuals to ethically produce and share content. This goal is reinforced by several learning objectives that emphasize the need to differentiate between original and repurposed content, to ethically remix and reuse openly licensed materials, and to always properly attribute intellectual property based on peer expectations.

The third goal reflects one of the key tenets of metaliteracy to “Produce and share information in collaborative and participatory environments.” Associated learning objectives ask the learner to envision themselves as producers of information. In doing so, they must be ethical and conscientious participants who share knowledge accurately and responsibly, while recognizing diverse cultures to effectively communicate information with global audiences.

The fourth metaliteracy goal empowers learners to “Develop learning strategies to meet lifelong personal and professional goals.” This is supported by several learning objectives that emphasize learning as a lifelong process and learning from errors or mistakes. The objectives encourage learners to assess their own gaps in knowledge, while being persistent and adaptable. Ultimately, this goal prepares individuals for being open to new learning, adapting to changing learning technologies, and applying metaliteracy through continued practice.

As interest in metaliteracy has expanded to a global audience, the next step in the development of the Metaliteracy Goals and Objectives is to translate this foundational work into different languages. The first translation of the Metaliteracy goals and learning objectives in French, Buts et Objectifs d’apprentissage, was developed by Florent Michelot, a Ph.D. candidate in andragogy at the Université de Montréal, based on a self-efficacy scale he designed that applies metaliteracy principles.

Openness is infused in the metaliteracy model and serves as a goal for praxis to provide teachers and learners with resources to apply the concepts. This approach reinforces the collaborative nature of metaliteracy as a learning theory, with associated goals and objectives, while influencing the design of jointly created and openly available learning objects and learning environments. The metaliteracy framework supports the goals of UNESCO’s Paris OER Declaration 2012 [21] to make content openly available as a human right and to do so through technologies and the development of collaborative learning environments. Metaliteracy and UNESCO’s concept of Media and Information Literacy (MIL) are similarly focused on the empowerment of people through the development of core information competencies, while metaliteracy emphasizes metacognitive reflection and learner as producer, as a central parts of the model. The International support for Open Educational Resources (OERs) has influenced metaliterate teaching and learning, as demonstrated in multiple metaliteracy projects designed by the Metaliteracy Learning Collaborative in open formats.

3 Opportunities for Open Pedagogy Using Open Educational Practices

The development of the OER movement over the past twenty years has created conditions for a transformational change in teaching and learning. New models and frameworks provide the basis for innovative, learner-centered pedagogical practices which align with the principles of open education and the values of community formation that are necessary to promote dialogue in an era of increasing polarization.

The open content movement has moved beyond the simple incorporation of open educational resources. The affordances offered by these adaptable sources provide a path to educational practices that shift modes of learning in significant ways. OER have provided the impetus for both open educational practices (OEP) and open pedagogy.

Cronin's definition of open educational practices extends to open digital spaces and openness between personal and professional boundaries: "Collaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer-learning, knowledge creation, and empowerment of learners" [4, p. 3].

DeRosa and Robison [6, p. 116] emphasize that "OER…empower faculty and students to work together to customize learning materials to suit specific courses and objectives. It's the way that the learning materials respond to learners and teachers that makes OER exciting…" Open pedagogy, which builds upon OER and OEP, envisages learners as active participants in knowledge creation. Courses become "platforms for learning, collaboration, and engagement with the world outside the classroom" [6, p. 117]. Smyth, Bossu, and Stagg advocate for an "open empowered learning model of pedagogy" that supports learners interacting not just with content, but also with other learners and with technology [19, p. 2201]. They envisage that learners will undertake the role of teachers, scaffolded by the potential of OER and OEP [19, pp. 2201-2].

Cronin refers to the work of Lane, "who suggests that open education initiatives can be considered in two broad forms [13]. The first seeks to transform or empower individuals and groups within existing structures…. A second form of open education seeks to transform the structures themselves, and the relationships between the main actors (learners, teachers, and educational institutions), in order to achieve equity" [5, pp.10–11]. Existing structures include educational situations, whether in person or online, that involve traditional relationships between teachers and learners. This type of learning frequently leads to formal degrees or certifications. The second form of open education leads to new learning opportunities, ones where the learner may play a pivotal role in determining a personal learning pathway. A possible outcome of such learning might be micro-credentials that attest to specific new knowledge and competencies attained by the learner.

In just this brief scan of the literature, the conception of learners as active participants, collaborators, and teachers is clearly inherent in open pedagogy. So too are they vital components of metaliteracy. Technology plays a role in OEP and open pedagogy, enabling the sharing of content and practices, and providing one way for learners to collaborate. Technology is also a core foundation of the metaliteracy framework, a mechanism for offering and using open content, and a means for engaging with and between learners.

The Metaliteracy Learning Collaborative, driven by a sense of inquiry informed by multifaceted situated experiences, develops open resources that allow not only for incorporation into existing structures such as formal courses, but also for use by lifelong learners as they chart and follow their self-directed learning pathways, which mesh with Lane's two broad forms of open education initiatives [13].

In the following section, we highlight several examples that showcase uses of these open resources, and the potential they provide for enabling learners to become reflective consumers and creators in today's complex information environment.

3.1 Think Globally, Act Locally

The open metaliteracy resources have been developed for the broadest possible use, not only geographically, but also for use by learners at different life stages and with different interests and focuses. They are pertinent for secondary and post-secondary education, as well as for formal and informal continuing education for learners in any field or career. Grappling with information and our roles as information users and producers is a universal concern, one that has acquired increasing urgency in recent years.

This emphasis on broad applicability is particularly obvious in the development of the four metaliteracy massive open online courses (MOOCs), which were designed to be open to all learners, regardless of their location. Lamentably, access to technology and language barriers are limiters; however, our experience has been that learners ranging from high school students to professionals to retirees throughout the world have taken advantage of these open resources.

In addition to the four MOOCs, The metaliteracy goals and learning objectives also inspired the development of the comprehensive Metaliteracy Badging System, a scaffolded suite of learning activities (Figure 3), which to date has primarily been used in formal educational settings. The learning system, which allows students to work their way toward four shareable digital badges, is designed to be flexible, so instructors may assign and integrate various components according to their particular instructional needs. The broad application of this instructional tool across a variety of disciplines at The University at Albany [18] and in MOOCs designed with Empire State College [17], in conjunction with more recently developed metaliteracy OERs, demonstrates the potential impact of these resources, as well as the adaptability inherent in OERs.

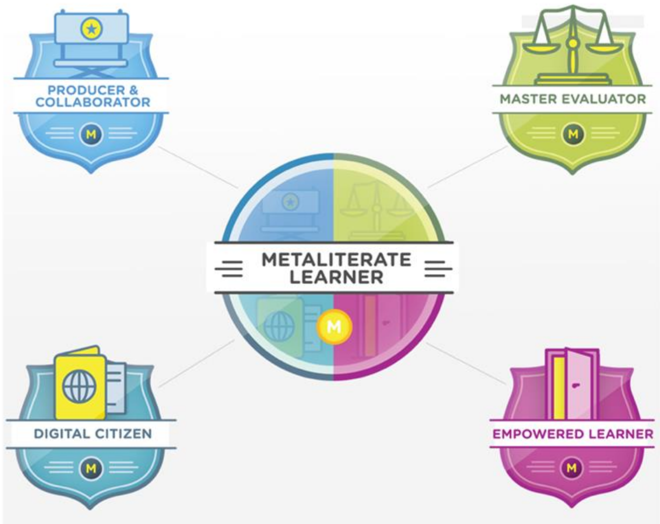

Fig. 3. The Metaliteracy Badges (https://metaliteracy.org/ml-in-practice/metaliteracy-badging/)

A fundamental characteristic of OERs is that they are available to be freely used and adapted by others. As the metaliteracy OERs undergo various implementations and modifications the metaliteracy framework itself is also evolving in response to these diverse use cases. It is particularly exciting that implementations have spurred the refinement of existing resources and the development of new core tools that are now available for use in new settings. Four local adaptations of the resources described above demonstrate the potential customizations and expansion of these learning tools by a range of educators.

Post-Truth MOOC and Wrap-around Course. After developing one connectivist MOOC and two xMOOCs, the Metaliteracy Learning Collaborative applied metaliteracy to the design of an Open edX MOOC to address the challenges of a post-truth society. This grant-funded project is supported by the Innovative Instruction Technology Grant (IITG) program at the State University of New York (SUNY) and is informed by Mackey and Jacobson's book *Metaliterate Learning for the Post-Truth World* [15]. Prior to the Open edX project, O'Brien, Forte, Mackey & Jacobson argued that metaliteracy is "a conceptual framework to address the challenges of learner-centered MOOC design" and analyzed the application of metaliteracy concepts in three different MOOCs "to enhance the engaged and participatory components of metaliterate learning" [17]. The authors found that metaliteracy is effective in supporting metacognition and self-regulation in learner-centered MOOC environments and that an approach to MOOC design that combines features of cMOOCs and xMOOCs would be especially beneficial to the learning experience [17]. This insight led to the selection of Open edX for the post-truth MOOC in an effort to explore platform features that allow for more freedom in the design of collaborative learning environments, and in the learning experience itself. As part of this project, a for-credit, fully-online version of the course has been designed and delivered at SUNY Empire State College to prepare learners for the MOOC. This wrap-around course links to the MOOC after several foundation modules, providing additional opportunities for metacognitive reflection and building a cohort that completes the open learning experience together.

Integrating Metaliteracy into a Discipline. A political science professor at the University at Albany, a frequent and enthusiastic user of the Metaliteracy Badging System, teaches a course incorporating the general education competencies of information literacy, critical thinking, and advanced writing. This professor was originally drawn to the components of the system that met course needs connected to information literacy and critical thinking, not only because of the content, but also through the open-ended activities that also promoted self-reflection. However, the instructor did not stop at assigning existing content; she also asked her students to create their own learning content that took the same form as those they were working through. They presented their learning units to the rest of the class, allowing an opportunity for peer review. Her goal was for learners to understand their roles as information producers and teachers, key elements of the metaliteracy framework. To signal the nature and value of this work, a Broaden Horizons badge was developed and awarded to those who successfully completed the semester-long, metaliteracy-infused course components.

This professor's deep engagement with this metaliteracy OER recently led to the development of a new resource. She mentioned that students did not fully understand or relate to the metaliterate learner roles, and asked whether it would be possible to provide more information about the roles. Using a constructivist model, we developed a series of questions that help to illuminate and promote exploration about each role. The professor has been exploring potential applications in her course. While this is an evolving process, her immediate response to an email message that these had been completed shows her enthusiasm: "So maybe a couple times in the semester I could explicitly have an exercise in class that in this case asks people to be translators, teachers etc. That could be fun." The expanded scaffolding for the learner roles has extended to an enhanced graphic that will be used in a range of our OERs, and will be available for others to use and adapt.

Customization of Existing Content in K-12 Settings. An instructor in the University at Albany's School of Education identified one of the four Metaliteracy badges, Digital Citizen, as a valuable resource that would help prepare her graduate students to teach these concepts in their own K-12 classrooms. This initial application expanded to a broader project through the support of an IITG, for which the Metaliteracy Learning Collaborative joined forces with graduate education programs at two different SUNY institutions to develop content that would support graduate students' metaliteracy competencies, specifically digital citizenship [2]. The School of Education instructor, who served as Principal Investigator for the grant, recognized that these competencies were critical to her students' success, both in the graduate program and in their future roles as educators. The project supported student inquiry by facilitating metacognitive thinking, empowering learners to take ownership of their learning, and strengthening their metaliterate mindset and digital citizenship skills. Similar to the first use case described above, a custom badge, Digital Citizenship for Educators, was developed for the graduate students who completed the required components. These included the existing activities required for the Digital Citizen badge, along with custom activities designed by the instructor that focused on digital media practices for the K-6 classroom.

This collaboration between University librarians and graduate education instructors culminated in a series of workshop presentations at a conference for local educators, and also led to the creation of Educators' Corner, an open suite of resources for teaching digital citizenship. Our collaborations on this grant provided valuable input as we attempted to create a model process for customizing applications of the system for various learning contexts. Ultimately our work on this grant sparked the idea of learning pathways as a solution that would facilitate customization of the metaliteracy badging content across disciplines and institutions.

Self-Directed Learner Challenge. The idea of the self-directed learner is an educational pillar that is central to lifelong learning and supported across multiple disciplines. By incorporating this idea into metaliteracy and building open resources around it, we have been able to share our interpretation of this foundational concept with educators and learners alike. In one example, we developed content for our badging system that specifically defined and described self-direction as part of a series of activities about Metacognitive Reflection (https://sites.google.com/view/metaliteracy/empowered-learner/metacognitive-reflection). Learners complete the Self-Direction challenge, along with the associated Critical Thinker and Learner as Teacher quests, to earn the Empowered Learner badge (https://sites.google.com/view/metaliteracy/empowered-learner). The Self-Direction challenge (https://sites.google.com/view/metaliteracy/empowered-learner/metacognitive-reflection/self-direction) features a narrative that encourages learners to reflect on the times in their life when they pursued learning on their own, both formally and informally. It quotes from one of the key figures in adult education, Malcolm S. Knowles who wrote:

> Self-directed learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. [12, p. 18]

This challenge culminates in a metacognitive writing assignment that asks learners to think through and respond to questions related to both individual reflection and peer reflection. Writing about and evaluating their experience with self-direction places learners in charge, with a focus on developing strategies for success and evaluating their own learning in conversation with peers.

At SUNY Empire State College, undergraduate students design their own concentrations by working collaboratively with a faculty mentor as part of a for-credit course, Educational Planning, which emphasizes self-direction. In an inventive reuse of the open content from the digital badging system, Dr. Susan Oaks, who oversees the online versions of Educational Planning course at SUNY Empire State College, repurposed the Self-Direction challenge as part of a major revision of the templates for Educational Planning. Dr. Oaks developed an entirely open resource for the course that serves as an open textbook in which the challenge is part of a chapter on Learning Engagement (https://courses.lumenlearning.com/suny-esc-educationalplanning/). This work is supported by a SUNY-wide initiative, OER Services, to expand the use of OERs throughout the system. As an open resource, this repurposed learning activity advances self-direction as part of Educational Planning while demonstrating how key this concept is to metaliterate learning as ongoing praxis in many different settings.

4 Challenges and Opportunities

The varied and broadening applications of the open metaliteracy resources have presented technical and logistical challenges, but they have also created opportunities to evolve these learning tools and expand the reach of metaliteracy to a global audience.

The Metaliteracy Badging System was originally conceptualized in 2012 as part of an IITG project that also established the Metaliteracy Learning Collaborative. At the same time, the open badging movement was beginning to take hold in the education landscape. From the outset it was clear that the principles of open badges were well-aligned with the goals of the metaliteracy framework as proponents of lifelong, self-directed learning that occurs both within and outside of the traditional classroom. Metaliteracy, likewise, empowers students to take ownership of their learning as a lifelong process through self-reflection and metacognitive thinking. Badging presented an opportunity to explore a more broadly scaled implementation and assessment of the learning goals established by the metaliteracy framework.

Originally developed on Wordpress, the Metaliteracy Badging System has since seen iterations on Canvas Network, Google Sites, Candela, and a homegrown platform that is expected to be launched in fall 2019. Over the course of its development the system has evolved both in content and in its reach across several learning contexts. From the beginning, our goal for this open learning tool was that it would be freely available for any learner or educator to access and adapt the content for their own needs. We intentionally developed this resource outside of a learning management system in order to ensure broader accessibility. However, as use of the system expands it becomes more challenging to ensure that it accommodates various teaching and learning scenarios.

The main challenges with creating open resources for metaliteracy have stemmed from issues with the learning platforms. We want our open resources to be free, accessible, flexible and customizable. However, many of the platforms we have tried for both the Metaliteracy MOOCs and the Metaliteracy Badging System restrict these open qualities in some way, sometimes due to technical issues, and other times due to the inherent design of the platform. These challenges have led to many iterations of our various metaliteracy projects, but they have also created opportunities for us to continually improve and refine these resources.

In the case of the badging system, we have been challenged to create mechanisms that facilitate remixing and customization of the content for various learning situations. Many instructors have expressed a desire to make tweaks to the content and assignments in order to align the activities with their curriculum, which we welcome for our openly licensed content; however, facilitating these adaptations within the existing platforms is complex, and has required us to develop our own badging system from scratch.

After several years of refining the badging system, we have identified a potential solution in the form of customized learning pathways that would allow the existing metaliteracy content to be remixed and augmented for specific learning contexts. In addition to making the content more adaptable, we envision this functionality, which we have started designing for the new version of the system, as a potential facilitator for inter-departmental and cross-campus collaborations. The pathways would bring together learning experiences from various disciplines and campus sectors that work towards common objectives and goals. These collaborations could potentially expand to K-12 schools, community organizations and employers. Furthermore, learning pathways can serve as valuable visuals for promoting metaliteracy learning, allowing educators to see how their colleagues are teaching with badges and for students to see potential pathways taken by their peers that they might also be interested in pursuing. Lucas Blair, co-founder of Little Bird Games, who has served as a consultant for this project, sees learning pathways or "skill trees" as a motivating visualization tool for students throughout the learning experience, helping them to understand learning objectives, visualize goals, and reflect on their progress [3, pp. 64-65].

As with the badging system, we have implemented the metaliteracy MOOCs on various platforms, including a homegrown connectivist MOOC (cMOOC), Coursera, and Canvas. The first metaliteracy cMOOC aimed to capture the spirit of the original connectivist MOOCs by decentralizing instruction and encouraging participants to generate content and make their own connections and interpretations. However, students were largely uncomfortable with this unconventional format, and it became clear that they required better instructional support in order to take on these more active roles in the course. The more familiar structure of the xMOOC platforms, Coursera and Canvas, helped guide students with built-in functionalities such as the peer assessment tool that helped facilitate the learner’s role as teacher. However, the rigidity of these platforms was also restrictive and perpetuated a lecture-centered model that counteracted our open pedagogical goals. Our latest MOOC, on metaliteracy in a post-truth world, offers a hybrid model that opens up the course to student discourse and contributions, while also providing scaffolding to support the development of active metaliterate learners.

5 Conclusion

As a global society, we are faced with enormous pressure to develop methods to address information-based challenges that affect our daily lives. Many of these challenges stem from the connectedness enabled by the web and social media. Technological solutions are being developed that will help to counter the dissemination of inaccurate information, but ultimately, people--citizens--need to learn how to engage successfully and productively in this post-truth milieu. Metaliteracy offers a pedagogical model to promote an approach that goes beyond technological solutions, with open learning resources that may be adapted to a wide range of learning environments, from formal to self-directed. The four applications documented in this paper provide just a small selection of ways to incorporate metaliteracy into effective teaching and learning practices. The goals and learning objectives, metaliterate characteristics and learner roles, and the associated learning objects are applicable regardless of discipline, and will continue to be adapted and adopted to fit specific needs. However, while the content is open and accessible, the technology that would enable the full integration of metaliteracy learning principles with content accessibility is lagging behind. Some functionalities, such as learning pathways, and some platforms may offer solutions that will help to mesh the two. As technologies that enhance connectedness are developed, their application to metaliteracy will be explored and refined to advance metaliterate learning.

6

References

1. Association of College & Research Libraries (ACRL). *Framework for Information Literacy for Higher Education*. Chicago: Association of College & Research Libraries, http://www.ala.org/acrl/standards/ilframework (2015), last accessed 2019/4/8.
2. Affinito, S., O'Brien, K., Jacobson, T., Forte, F., Mahar, D., Gardner-Athey, K.: Scaling the Metaliteracy Badging System for Open SUNY: Collaborative Customization for Teacher Education Programs. *SUNY IITG*, http://commons.suny.edu/iitg/view/project-view/entry/466/ (2017), last accessed 2019/4/8.
3. Blair, L. What Video Games Can Teach Us About Badges and Pathways. In: Muilenburg, L. Y., Berge, Z. L. (eds.) Digital Badges in Education: Trends Issues and Cases, pp. 62-70. Routledge https://books.google.com/books?id=bbnOCwAAQBAJ&lpg=PR4&pg=PA62#v=onepage&q&f=false (2016), last accessed 2019/3/20.

4. Cronin, C.: Openness and Praxis: Exploring the Use of Open Educational Practices in Higher Education. The International Review of Research in Open and Distributed Learning 18(5), (2017).
5. Cronin, C.: Openness and Praxis: A Situated Study of Academic Staff Meaning-Making and Decision-Making with Respect to Openness and Use of Open Educational Practices in Higher Education. NUI Galway. http://hdl.handle.net/10379/7276. (2018), last accessed 2019/4/8.
6. DeRosa, R., Robinson, S.: From OER to Open Pedagogy: Harnessing the Power of Open. In Jhangian, R. S., Biswas-Diener, R, (eds.) Open: The Philosophy and Practices That Are Revolutionizing Education and Science, pp.115–24. Ubiquity Press (2017), https://doi.org/10.5334/bbc.i.
7. Flavell, J. H. Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry. *American Psychologist*, 34(10), 906-11 (1979).
8. Fulkerson, D., Ariew, S.A., Jacobson, T. E.: Revisiting Metacognition and Metaliteracy in the ACRL Framework. Communications in Information Literacy, 11(1), 21-41 (2017).
9. Jacobson, T., Mackey, T., O'Brien, K., Forte, M., O'Keeffe, E.: Goals and Learning Objectives. Metaliteracy.org, https://metaliteracy.org/learning-objectives/ (2018), last accessed 2019/4/5.
10. Jacobson, T. E., Mackey, T. P.: Metaliteracy in Practice. ALA/Neal-Schuman, Chicago (2016).
11. Jacobson, T. E., Mackey, T. P.: Proposing a Metaliteracy Model to Redefine Information Literacy. Communications in Information Literacy, 7(2), 84-91 (2013).
12. Knowles, M. S.: Self-Directed Learning. A Guide for Learners and Teachers, Prentice Hall/Cambridge, New York. (1975).
13. Lane, A.: Emancipation through Open Education: Rhetoric or Reality? In Blessinger, P. J., Bliss, T. J. (eds.) Open Education: International Perspectives in Higher Education, pp. 31–50. Open Book Publishers (2016), https://doi.org/10.11647/OBP.0103.02.
14. Mackey, T P., Jacobson, T. E.: Reframing Information Literacy as a Metaliteracy. College & Research Libraries, 72(1): 62-78 (2011).
15. Mackey, T. P., Jacobson, T. E.: Metaliterate Learning for the Post-Truth World. ALA/Neal-Schuman, Chicago (2019).
16. Mackey, T. P., Jacobson, T. E.: Metaliteracy: Reinventing Information Literacy to Empower Learners. ALA/Neal-Schuman, Chicago (2014).
17. O'Brien, K. L., Forte, M., Mackey, T. P., Jacobson, T. E.: Metaliteracy as Pedagogical Framework for Learner-Centered Design in Three MOOC Platforms: Connectivist, Coursera and Canvas. Open Praxis, 9(3), 267-286 (2017). http://dx.doi.org/10.5944/openpraxis.9.3.553, last accessed 2019/4/8.
18. Pitera, J., O'Brien, K.L.: Using Badging as an Open Educational Resource. NERCOMP. Northeast Regional Computing Program. Providence, RI. 31 March, 2015. Conference Presentation. https://www.slideshare.net/kelmo/using-badging-as-an-open-educational-resource, last accessed 2019/4/8.
19. Smyth, R., Bossu, C., Stagg, A.: Toward an Open Empowered Learning Model of Pedagogy in Higher Education. In Blended Learning: Concepts, Methodologies, Tools, and Applications, 2196–2214. Information Resources Management Association (2016).
20. United Nations Educational, Scientific, and Cultural Organization (UNESCO) Media and Information Literacy. http://www.unesco.org/new/en/communication-and-information/media-development/media-literacy/mil-as-composite-concept/ (2019) last accessed 2019/4/8.

21. United Nations Educational, Scientific, and Cultural Organization (UNESCO) Media and Information Literacy. The Paris OER Declaration https://en.unesco.org/oer/paris-declaration (2012) last accessed 2019/4/8.