

# Building Future-Ready Learners: Constructivism and Lesson Planning

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*Abstract: As the world undergoes rapid transition, at the same time that it faces unprecedented global challenges, it becomes increasingly apparent that our focus ought to be on teaching learners how to learn, how to be mindfully and critically evaluative and reflective, and how to be resilient and adapt to the challenges expected in an uncertain future. For educators to meet the ever-changing learning needs of society, the ability to weave together knowledge of pedagogy, content, and instructional design is a prerequisite for effective future teaching and learning. This paper illustrates these relationships by applying a constructivism lens to an existing Creative Commons lesson plan.*

*Keywords: Constructivism, Lesson Planning, Pedagogy, Learner-centred, 21<sup>st</sup>-Century Skills, Learning*

## Introduction

Society's need for learning is changing, as evidenced by the plethora of literature regarding the preparation of learners for 21<sup>st</sup> century skills and competencies (Benson-Armer et al., 2016; OECD, 2018; UNESCO Education Sector, 2016; World Bank, 2017; World Economic Forum, 2020). At the same time, and often seemingly in conflict, the world faces unprecedented global challenges, such as climate change (Leal Filho et al., 2020; Orr, 1992, 1993, 2009; Reid, 2019; Reuters Staff, 2019), with little historical perspective from which to draw wisdom. Traditional approaches to teaching and learning, which emerged during the Industrial Revolution, no longer prepare learners for the realities of their futures. Therefore, we should not view learners as empty vessels or blank slates passively awaiting information, nor should we expect educators to be the experts (Scott, 2015; Rodriguez, 2012).

Instead, learning should become a true partnership, “a learning community” (Peters & Mathias, 2018, p. 54). Although they have different roles, educators and learners—all learners—should engage and participate equally in curriculum and pedagogy, and co-create knowledge from which learners can synthesize and make meaning (Angheloiu, Chaudhuri, & Sheldrick, 2018; Bovill, 2020; Peters & Mathias, 2018). According to Freire (2000), such an approach toward learner autonomy re-humanizes learners and gives them hope. More importantly, it provides them with the confidence, consciousness, and criticality of thought to question the status quo of the world around them.

Constructivism is one such approach that can prepare learners for challenging uncertain futures. Within this approach, learners develop heightened cognition when actively making sense of new information—obtained through observation, discovery, or other forms of exploration—by relating it to what they already know, guided by the educator (Bada, 2015; Bovill, 2020). Moreover, as learners collaborate in the co-creation of knowledge, they also experience and reconcile the divergent perspectives of their peers (Bada, 2015; Bovill, 2020; Oliver, 2000; Vong, 2016). Consequently, each learner's perception of the world is uniquely their own and constantly changes with successive experiences with new information.

Increasingly, it is recognized that global citizens will require 21<sup>st</sup> century skills—creativity, communication, collaboration, and critical thinking, among others—to successfully navigate future challenges (Eilam, 2017; Jansen & van der Merwe, 2015; Padmadewi, 2020). A lesson plan is one tool that is available, if used effectively by educators, to prepare learners with the autonomous learning skills they will require in the 21<sup>st</sup> century (Padmadewi, 2020). This paper explores the concept of adapting pedagogy to meet society's changing needs for learning. As a case study, I use the lens of constructivism to critically evaluate a Creative Commons licensed lesson plan, selected explicitly because of its benefit to learners in helping them create and co-create their own meaning when engaged in learning activities.

## Lesson Plan Evaluation

The ability to weave together knowledge of pedagogy, content, and instructional design is a prerequisite for effective lesson planning (Ab Kadir, 2018; Çolak, 2017). For a lesson plan to be constructivist, it should motivate learners to consider their prior knowledge and include activities that create a cognitive imbalance, a relational disconnect between

prior knowledge and new information. Collectively, this is known as the exploratory phase. It should also offer opportunities for learners to apply their new knowledge and reflect on their learning collectively, through a discovery phase (Çolak, 2017; Vermette et al., 2010). In effect, a constructivist lesson plan is less an agenda for the educator and more an outline of possible learner experiences (Vermette et al., 2010).

The constructivist view of the “learner as an active agent in the process of knowledge acquisition” (Bada, 2015, p. 66) has implications for both curriculum and pedagogy. Specifically, it suggests that learning outcomes should focus on constructing—rather than simply acquiring—knowledge and that learner evaluation should use authentic assessment (Bada, 2015; Tuohy, 2005). There are four primary characteristics of constructivist learning outcomes: (1) they should be small and specific enough to be demonstrable; (2) they should scaffold learning around essential discipline-specific concepts; (3) they should be learnable within a short period; and (4) they should be realistically assessable (Vermette et al., 2010). Constructivism also has implications for the educator, who becomes a facilitator engaged in guiding learners through the process of learning and making meaning as new knowledge relates to prior knowledge (Bada, 2015; Vong, 2016). The agency, autonomy, and self-efficacy that learners acquire through this process should position and better prepare them for their respective futures (Bada, 2015; Tuohy, 2005).

The lesson plan for the workshop “Fact or Fiction: Distinguishing Reality Online” (hereafter “Lesson Plan”) is an example (see Table 1) that I developed using an exploratory teaching approach (White, 2020). This approach typically engages learners in constructing their own knowledge by completing tasks for which there is no obvious pathway or solution, such as in problems or investigations that involve questioning and extending tasks beyond their original parameters (Brunheira & da Ponte, 2016). By interpreting the information they observe, developing themes and strategies, and determining how best to communicate their findings, learners reinforce and extend their own meanings regarding concepts and procedures while, at the same time, honing their communication skills by engaging in discourse with others. Typically, exploratory learning follows a pathway with three primary learning activities: (1) interpreting the task; (2) completing the task individually or in groups; and (3) synthesizing the data for presentation and discussion (Brunheira & da Ponte, 2016). When an entire class of learners is engaged in generating new knowledge, Bovill refers to this as “whole-class co-creation” (2020, p. 1025).

Table 1. Fact or Fiction: Distinguishing Reality Online

<b>Overview</b>	
In this 3.5-hour workshop, learners in Grades 11 and 12 (and adaptable to other grade levels) assess the reliability and credibility of online resources. They explore how misinformation and fake news can distort biases and perspectives, ultimately making it difficult to be objective in the selection of resources, as aids to both effective learning and informed civic action and decision-making.	
<b>Learning Outcomes</b>	
Students will:	
<ul style="list-style-type: none"><li>→ Define misinformation and fake news and how it can affect personal biases and perspectives.</li><li>→ Discover how to mitigate bias when searching for information online.</li><li>→ Use best practices to authenticate sources of credible and reliable information:<ul style="list-style-type: none"><li>○ Find and verify the original source</li><li>○ Check other sources</li><li>○ Use fact-checking tools</li></ul></li></ul>	
<b>Preparation and Resources</b>	
<b>Learner Preparation:</b>	<ul style="list-style-type: none"><li>→ Ask learners to do some advance work in their own information feeds to identify four articles that share information about recent or current events.<ul style="list-style-type: none"><li>○ Each article should be from a different social media feed, if possible, and should provide information about a different topic or event.</li><li>○ Learners should bring these articles with them.</li></ul></li></ul>
<b>Instructor Preparation:</b>	<ul style="list-style-type: none"><li>→ Ensure that Wi-Fi access is available.</li></ul>

- Familiarize yourself with the lesson plan and content. The facilitator guides “[How to tell what’s true online](#)” and “[Digital Literacy Framework: Grades 9-12](#)” may be valuable resources for you with many ideas and content beyond this workshop.
- Download the “[Three Steps to Verify a Website](#)” presentation.
- Queue access to the following websites:
  - [Break the Fake News Quiz](#)
  - [Using Fact-Checking Tools](#)
  - [Reality Check: The Game](#)
  - [The North American house hippo is back](#)
- Print copies of the following documents, available at <https://www.oercommons.org/courses/lesson-plan-fact-or-fiction-distinguish-reality-online/view>:
  - True or False: How People Change Their Minds
  - Website Evaluation Assignment

Teaching Plan	
00:00 – 00:10	<ul style="list-style-type: none"> <li>→ Welcomes and introductions.</li> <li>→ Acknowledge the traditional territory where the workshop is being held. If needed, Native Land Digital’s “<a href="#">Territory Acknowledgement</a>” resource will help you identify traditional territories and why acknowledgements are important.</li> </ul>
00:10 – 00:15	<ul style="list-style-type: none"> <li>→ Introduce house hippos:                             <ul style="list-style-type: none"> <li>○ House hippos were introduced to Canadians in 1999 and almost 90% of Canadians believed in them or hoped they were true.</li> <li>○ Play audio recording: “The North American house hippos is back – and ready to tackle fake news.”</li> </ul> </li> </ul>
00:15 – 00:25	<ul style="list-style-type: none"> <li>→ Engage learners in personal reflection about bias:                             <ul style="list-style-type: none"> <li>○ Think for a moment about something about which they have a strong opinion – not something like “gravity” that has already been proven, but something like whether aliens or Planet X exist or not.</li> <li>○ Think about why they hold the opinion they do. What causes them to believe this? What would it take to change their minds?</li> </ul> </li> </ul>
00:25 – 00:35	<ul style="list-style-type: none"> <li>→ Hand out the quiz “True or False: How People Change Their Minds”</li> <li>→ Learners complete the quiz individually.</li> </ul>
00:35 – 00:55	<ul style="list-style-type: none"> <li>→ Review the quiz with learners, taking a poll about responses as you go.                             <ul style="list-style-type: none"> <li>○ Consult the “Procedures: True or False” document for talking points.</li> <li>○ Weave two concepts into the conversation: <i>unconscious/implicit bias</i> and <i>colonial mentality</i>.</li> </ul> </li> </ul>
00:55 – 01:10	<ul style="list-style-type: none"> <li>→ Begin the “3 Steps to Verify a Website” presentation:                             <ul style="list-style-type: none"> <li>○ Title slide: Ask learners what steps they use to determine if online information is true.</li> <li>○ Slide 2: Ask learners how they would find the original source.</li> <li>○ Slides 3-4: Solution - follow the links to identify the source.</li> <li>○ Slide 5: Ask learners how they would determine which source is legitimate.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Slides 6-10: Solutions - both legitimate organizations; one has significantly more membership (maybe more credibility); one has some bias around sexual orientation (may affect credibility).</li> <li>○ Slide 11: Ask learners how they would check other sources to verify this story.</li> <li>○ Slides 12-14: Solutions - in this case, all stories are from the same source; no consensus on Wikipedia; search expert sources (fact checking tools).</li> </ul>
01:10 – 01:25	→ Break
01:25 – 01:35	<ul style="list-style-type: none"> <li>→ Show: “Use Fact-Checking Tools” video</li> <li>→ Ask learners if anyone has used a fact-checking site. What was their experience like? Were they able to validate/refute a story?</li> </ul>
01:35 – 02:35	<ul style="list-style-type: none"> <li>→ Introduce learners to the “Reality Check Game.” <ul style="list-style-type: none"> <li>○ Provide them with the URL and ask them to play the game individually.</li> <li>○ Select and complete all 5 missions.</li> </ul> </li> </ul>
02:35 – 02:45	→ Debrief learners’ experiences with the game.
02:45 – 03:10	→ Break learners into manageable groups and have them work together to determine the validity of at least 4 of the sample articles they brought with them.
03:10 – 03:20	→ Ask one member from each group to present one article they reviewed and share their approach to establishing validity.
03:20 – 03:30	<ul style="list-style-type: none"> <li>→ Final debrief of the workshop. As part of this activity, ask learners to complete the sentence: “Today, I was helped by my classmates when…” on a piece of paper.</li> <li>→ Assessment / Extension: <ul style="list-style-type: none"> <li>○ Learners complete the “Website Evaluation Assignment.”</li> <li>○ Submit responses along with a summary of their approach to determining responses, including examples.</li> </ul> </li> </ul>

### Assessment and Evaluation

#### *Website Evaluation Assignment*

Imagine you are conducting research for assignments on several topics. You find several online resources but must determine if you can use them for your research. For each of these websites, complete the table below to determine the reliability and validity of each website as a resource:

<i>Topic</i>	<i>Website</i>
COVID-19	<a href="https://www.thenakedscientists.com/articles/interviews/vaccinating-world-fairly">https://www.thenakedscientists.com/articles/interviews/vaccinating-world-fairly</a>
Bananas	<a href="https://cosmosmagazine.com/biology/can-bananas-kill-you">https://cosmosmagazine.com/biology/can-bananas-kill-you</a>
Migration	<a href="https://theconversation.com/ca/topics/migrants-2389">https://theconversation.com/ca/topics/migrants-2389</a>
National debt	<a href="https://www.davemanuel.com/canada-debt-clock.php">https://www.davemanuel.com/canada-debt-clock.php</a>
Racism	<a href="https://www.lacortenews.com/n/mcconnell-gives-brutally-honest-answer-when-asked-about-his-family-history">https://www.lacortenews.com/n/mcconnell-gives-brutally-honest-answer-when-asked-about-his-family-history</a>

	<i>COVID-19</i>	<i>BANANAS</i>	<i>MIGRATION</i>	<i>DEBT</i>	<i>RACISM</i>
<b>Authority</b>					
What type of information is provided at the URL? Give					

examples (education, commercial, etc.)					
Is there an author?					
What is the author's purpose? Give examples (information, persuasion, entertainment, etc.)					
What is the author's expertise?					
What organizations are affiliated with this site?					
<b>My decision (based on authority)</b>	<input type="checkbox"/> Valid source <input type="checkbox"/> Needs research				

**Content**

What type of information is provided on the home page? Give examples (detailed information, advertising, reputable links, etc.)					
Are text and graphics free of errors?					
Is bias represented? Give examples.					
What does the information represent? Give examples (fact, opinion, propaganda, etc.)					
What fact checking did you do? Give examples.					
<b>My decision (based on content)</b>	<input type="checkbox"/> Valid source <input type="checkbox"/> Needs research				
<b>MY DECISION (OVERALL)</b>	<input type="checkbox"/> Valid source <input type="checkbox"/> Needs research				

**Rubric for Student Evaluation**

<i>Excellent</i>	<i>Very Good</i>	<i>Competent</i>	<i>Basic</i>
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<p>Uses all best practices in an integrated manner to authenticate sources of credible and reliable information effectively and appropriately (see learning outcomes) to justify a decision.</p> <p>Identifies examples that are accurate, relevant, and that thoroughly address each criterion, including examples that may not be obvious.</p> <p>Identifies sufficient examples that both support and question the website’s credibility to offer a balanced assessment.</p> <p>Insights are thoughtful and relevant and ratings are realistic given the evidence.</p>	<p>Uses all best practices in a sequential manner to authenticate sources of credible and reliable information effectively and appropriately (see learning outcomes) to reach a decision.</p> <p>Identifies obvious examples that are accurate, relevant, and that address each criterion.</p> <p>Identifies examples that both support and question the website’s credibility to offer a balanced assessment.</p> <p>Insights are relevant and ratings are realistic given the evidence, but lack the justification provided by linking the decision back to learning outcomes.</p>	<p>Uses some best practices to authenticate sources of credible and reliable information (see learning outcomes) to reach a decision.</p> <p>Identifies examples that are largely accurate, generally relevant, and that address each criterion.</p> <p>Identifies a few examples that both support and question the website’s credibility to offer a somewhat balanced assessment.</p> <p>Reaches appropriate decisions but lacks thoughtful justification.</p>	<p>Uses some best practices to authenticate sources of credible and reliable information (see learning outcomes).</p> <p>Identifies examples that are generally accurate and relevant, and that address some of the criteria.</p> <p>Identifies examples that tend to either support or question the website’s credibility.</p> <p>Only the most obvious reasons are provided, and some ratings are realistic given the evidence.</p>
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Source: Ookpik Service Inc. adapted from White (2020).

The Lesson Plan (White, 2020) aligns with the four primary constructivist themes as presented in Table 2. At its root, an exploratory approach to lesson planning provides opportunities for learning and assessment that are contextually authentic. In the Lesson Plan, learners begin with an exercise in self-reflection that asks them to think about what they know, why they know it, and what conditions might need to exist for them to consider revising what they know. This is a vital step in the process of critical thinking and learning how to learn. Angheloiu et al. (2018) argue that learners should extend self-reflection to consider and include their place in the world around them. The lesson plan reflects this by introducing the concepts of *unconscious bias* and *colonial mentality*. Additionally, these concepts offer an opportunity to include discussion and perspectives on Indigenous ways of knowing, as they relate to bias, in the conversation.

Table 2. Constructivist Themes with Activities from the Lesson Plan

Constructivist Theme	Activities
Connection between prior knowledge and new knowledge	<ul style="list-style-type: none"> <li>Establish current knowledge baseline by completing the “True or False: How People Change Their Minds” quiz.</li> <li>Extend knowledge and meaning during the “3 Steps to Verify a Website” presentation.</li> <li>Debrief the “Reality Check Game.”</li> <li>Combine prior and new knowledge and skills to complete the “Website Evaluation Assignment.”</li> </ul>

Constructivist Theme	Activities
Social interaction between peers and/or with the instructor	<ul style="list-style-type: none"> <li>• Debrief following the “True or False: How People Change Their Minds” quiz.</li> <li>• Collaborate and problem-solve for slides 2, 5, and 11 during the “3 Steps to Verify a Website” presentation.</li> <li>• Debrief the “Use Fact-Checking Tools” video.</li> <li>• Collaborate in groups to analyze sample articles.</li> <li>• Create a presentation and synthesize experiences showing validity.</li> <li>• Share perspectives during the final debrief.</li> </ul>
Authentic tasks that extend knowledge	<ul style="list-style-type: none"> <li>• Collaborate and problem-solve for slides 2, 5, and 11 during the “3 Steps to Verify a Website” presentation.</li> <li>• Play the “Reality Check Game.”</li> <li>• Use fact-checking tools.</li> <li>• Collaborate in groups to analyze sample articles.</li> <li>• Analyze online resources during the “Website Evaluation Assignment.”</li> <li>• Recognize important characteristics of authority and content of online resources during the “Website Evaluation Assignment.”</li> <li>• Find and relate examples that show the validity of online resources during the “Website Evaluation Assignment.”</li> <li>• Determine the efficacy of online resources during the “Website Evaluation Assignment.”</li> </ul>
Activities that promote self-reflection	<ul style="list-style-type: none"> <li>• Reflect on firmly held opinions and prerequisites for a change of opinion.</li> <li>• Reflect and summarize approaches to showing the validity of online resources during the “Website Evaluation Assignment.”</li> <li>• Share perspectives during the final debrief.</li> </ul>

The outcome “Use best practices to authenticate sources of credible and reliable information” meets all criteria, as do all outcomes included in the lesson plan. In this example, learners authenticate sources using tools and best practices in a variety of situations. Specifically, they practice finding and verifying the original source, checking other sources, and using fact-checking tools. This facilitates the understanding of each practice, as well as how they integrate to address more challenging authentications. This workshop is important because it provides learners in Grades 11 and 12 the opportunity to develop and establish knowledge and skills related to the authentication of sources. This skill will undoubtedly be of value as they progress into college or university and throughout their lives.

Connecting with learners’ prior knowledge in the exploratory phase is key to the successful achievement of learning outcomes for several reasons. First, it serves to “ramp up” motivation to learn by starting with something familiar. Then, asking learners to think about the conditions that need to exist for them to revise what they know introduces the initial stages of cognitive imbalance in a structured manner. The prior knowledge helps to assuage any anxiety learners may have about venturing into the unknown. It also gives learners both permission and a strategy to consider revising their prior knowledge.

Moving beyond reflection on prior knowledge and into the discovery phase, educators use the presentation to lead learners through problem identification and source authentication using an active learning approach. Then, through gamification intended to further motivate, learners practice their new knowledge and build source authentication skills. Subsequently, they engage in a similar activity in groups. This allows them to continue to practice skill development, while at the same time observing how others approach a problem, gaining a level of comfort in asking questions of others, and experiencing how collective wisdom can be helpful. Finally, in the “Website Evaluation Assignment,” learners have an opportunity to extend their learning, solidify their authentication skills, and (by summarizing their approaches to authentications) integrate new knowledge more firmly into and within prior knowledge.

To assess learning, educators have several potential strategies. First, they may collect or observe evidence of learning through whole class and group discussions. They may ask clarifying questions to scaffold learning further or change learning activities, as required. Educators may offer feedback during these discussions. During the final debrief, learners complete the statement, “Today, I was helped by my classmates when...” In the process of reviewing the submissions, educators can assess respectful help-seeking behaviours. Finally, the Website Evaluation Assignment is, simultaneously, a formative and summative assessment. Educators may use the assignment results to offer extension learning activities, as needed, either to individual learners or the entire class.

In the future, educators may engage learners to employ their knowledge and skills related to source authentication in all activities requiring online research. This serves to continue the extension of learning through practical applications.

## **Conclusion**

The phrase “On those stepping into rivers staying the same other and other waters flow” (Graham, 2019, para. 19) is attributed to Heraclitus, a Greek philosopher born in 544 BCE. On the surface, it appears contradictory but, after further consideration, indeed, a river is still a river despite its contents being in constant change. The underlying meaning is that some things stay constant only by changing. The paradoxical concepts of constancy and change are interconnected, making change (ironically) a condition of constancy (Graham, 2019). In other words, the river adapts to its environment through a process that replaces prior existing waters with new waters.

Similarly, one might consider the concepts of education and curriculum in light of Heraclitus’ observation. If education refers to knowledge and development stemming from the process of being educated (Merriam-Webster, n.d.) and if the purpose of education is to prepare citizens for the future (Ab Kadir, 2018; Angheloiu et al., 2018; Paniagua & Istance, 2018; Savage, 2017), then education is the river, the constant, and curriculum is the water, always changing to provide for the educational needs of the day. This requires, in turn, that educators adapt and adopt pedagogical approaches accordingly to address the rapid pace of change associated with unprecedented global challenges (Angheloiu et al., 2018; Orr, 2020; Reid, 2019). This may be best achieved if pedagogies foster learning communities and partnerships between learners that allow them to develop, integrate, and strengthen autonomous learning skills.

Learning is a messy and non-linear process in which learners progress, lose ground, and progress again (Vong, 2016). In the spirit of Indigenization, “for every educator, our responsibility is making a commitment to [guide learners to] both unlearn and learn” (Battiste, 2010, p. 166). The ongoing cycle of unlearning and learning, rather than slowly and awkwardly adapting to changing circumstances and information, will position learners well in a fast-paced, rapidly changing world.

## REFERENCES

- Ab Kadir, M. A. (2018). Developing critical thinkers in the 21<sup>st</sup> century: Gaps in teacher education? In K. M. Baharul Islam & S. Nitas Iftekhhar (Eds.), *International Perspectives on Comparative Education Policy* (pp. 330–342). Bloomsbury.
- Angheloiu, C., Chaudhuri, G., & Sheldrick, L. (2018). Alternative futures as a method for equipping the next generation of designers and engineers. In E. Bohemia, A. Kovacevic, L. Buck, P. Childs, S. Green, A. Hall, & A. Dasan (Eds.), *DS 93: Proceedings of the 20th International Conference on Engineering and Product Design Education (E&PDE 2018)* (pp. 752–757), London, United Kingdom.
- Bada, S. O. (2015). Constructivism learning theory: A paradigm for teaching and learning. *IOSR Journal of Research & Method in Education*, 5(6 Ver. 1), 66–70. <https://doi.org/10.9790/7388-05616670>
- Battiste, M. (2010). Nourishing the learning spirit. *Education Canada*, 50(1). <https://www.edcan.ca/wp-content/uploads/EdCan-2010-v50-n1-Battiste.pdf>
- Benson-Armer, R., Gast, A., & van Dam, N. (2016). *Learning at the speed of business*. McKinsey & Company.
- Bovill, C. (2020). Co-creation in learning and teaching: The case for a whole-class approach in higher education. *Higher Education*, 79(6), 1023–1037. <https://doi.org/10.1007/s10734-019-00453-w>
- Brunheira, L., & da Ponte, J. P. (2016). Prospective teachers work on defining quadrilaterals through an exploratory approach. *Didactica Mathematicae*, 38, 33–56.
- Çolak, E. (2017). Öğretmenlerin mesleki öğrenme topluluğundaki yapılandırmacı ders planı hazırlama deneyimleri: İlkokul öğretmenleriyle yapılmış bir örnek olay çalışması [Teachers' experiences in a professional learning community on the constructivist lesson planning: A case study among primary school teachers]. *Eğitim ve Bilim [Education and Science]*, 42(190), 189–209. <https://doi.org/10.15390/EB.2017.6911>
- Eilam, B. (2017). Probing teachers' lesson planning: Promoting metacognition. *Teachers College Record*, 119(13), 1–28.
- Freire, P. (2000). *Pedagogy of the Oppressed*. Continuum.
- Graham, D. W. (2019). Heraclitus. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Fall 2019). Metaphysics Research Lab, Stanford University.
- Jansen, C., & van der Merwe, P. (2015). Teaching practice in the 21st century: Emerging trends, challenges and opportunities. *Universal Journal of Educational Research*, 3(3), 190–199.
- Leal Filho, W., Wolf, F., Lange Salvia, A., Beynaghi, A., Shulla, K., Kovaleva, M., & Vasconcelos, C. R. P. (2020). Heading towards an unsustainable world: Some of the implications of not achieving the SDGs. *Discover Sustainability*, 1(1), 1–11. <https://doi.org/10.1007/s43621-020-00002-x>
- Luna Scott, C. (2015). *The futures of learning 3: What kind of pedagogies for the 21st century?* (ERF Working Paper Series No. 15; UNESCO Education Research and Foresight, pp. 1–21). UNESCO. <http://repositorio.minedu.gob.pe/handle/20.500.12799/3747>
- Merriam-Webster. (n.d.). *Education*. <https://www.merriam-webster.com/dictionary/education>
- OECD. (2018). *The future of education and skills: Education 2030*. OECD Publishing. [http://www.oecd.org/education/2030-project/about/documents/E2030%20Position%20Paper%20\(05.04.2018\).pdf](http://www.oecd.org/education/2030-project/about/documents/E2030%20Position%20Paper%20(05.04.2018).pdf)
- Oliver, K. M. (2000). Methods for developing constructivist learning on the Web. *Educational Technology*, 40(6), 5–18.
- Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. SUNY Press.
- Orr, D. W. (1993). *Environmental literacy: Education as if the Earth mattered*. Twelfth Annual E. F. Schumacher Lectures, Great Barrington, MA. <http://sfsf.com.au/Education.As.If.The.Earth.Mattered.pdf>
- Orr, D. W. (2009). *Down to the wire: Confronting climate collapse*. Oxford University Press.
- Orr, D. W. (2020). Preface: The (missing) politics in environmental and sustainability education. *New Directions for Teaching and Learning*, 161, 13–21. <https://doi.org/10.1002/tl.20370>
- Padmadewi, N. N. (2020). Promoting autonomous learning and 21st century skills of English education students through empowering their pedagogical skills. *Advances in Social Science, Education and Humanities Research*, 438, 106–111.
- Paniagua, A., & Istance, D. (2018). *Teachers as Designers of Learning Environments*. OECD Publishing. <http://dx.doi.org/10.1787/9789264085374-en>

- Peters, J., & Mathias, L. (2018). Enacting student partnership as though we really mean it: Some Freirean principles for a pedagogy of partnership. *International Journal for Students as Partners*, 2(2), 53–70. <https://doi.org/10.15173/ijpsap.v2i2.3509>
- Reid, A. (2019). Climate change education and research: Possibilities and potentials versus problems and perils? *Environmental Education Research*, 25(6), 767–790. <https://doi.org/10.1080/13504622.2019.1664075>
- Reuters Staff. (2019, July 31). BoE's Carney warns of bankruptcy for firms that ignore climate change. *Reuters*. <https://www.reuters.com/article/us-britain-boe-carney-idUSKCN1UQ28K>
- Rodriguez, V. (2012). The teaching brain and the end of the empty vessel. *Mind, Brain, and Education*, 6(4), 177–185. <https://doi.org/10.1111/j.1751-228X.2012.01155.x>
- Savage, G. C. (2017). Powers of curriculum: Sociological perspectives on education. In B. Gobby & R. Walker (Eds.), *Powers of Curriculum: Sociological Perspectives on Education* (pp. 143–165). Oxford University Press.
- Tuohy, D. (2005). *The Inner World of Teaching: Exploring Assumptions*. (2<sup>nd</sup> ed.). Falmer Press.
- UNESCO Education Sector. (2016). *Leading better learning: School leadership and quality in the Education 2030 agenda* (p. 223). UNESCO. <http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/pdf/leadership-report.pdf>
- Vermette, P. J., Jones, K. A., Jones, J. L., Werner, T., Kline, C., & D'Angelo, J. (2010). A model for planning learning experiences to promote achievement in diverse secondary classrooms. *SRATE Journal*, 19(2), 70–83.
- Vong, S. (2016). A constructivist approach for introducing undergraduate students to special collections and archival research. *RMB: A Journal of Rare Books, Manuscripts, and Cultural Heritage*, 17(2), 148–171. <https://doi.org/10.5860/rbm.17.2.9666>
- White, L. A. (2020). *Fact or Fiction: Distinguishing Reality Online*. <https://www.oercommons.org/courses/lesson-plan-fact-or-fiction-distinguish-reality-online>
- World Bank. (2017). *World Development Report 2018: Learning to realize education's promise*. The World Bank Group. <https://doi.org/10.1596/978-1-4648-1096-1>
- World Economic Forum. (2020). *Schools of the future: Defining new models of education for the 4th industrial revolution* (p. 34). World Economic Forum. [http://www3.weforum.org/docs/WEF\\_Schools\\_of\\_the\\_Future\\_Report\\_2019.pdf](http://www3.weforum.org/docs/WEF_Schools_of_the_Future_Report_2019.pdf)

#### ABOUT THE AUTHOR

**Lawrence A. White:** Lawrence A. White is an advanced graduate student pursuing a Doctor of Education (EdD) at Unifac University. He holds a Master of Distance Education (MDE) and a Bachelor of Environmental Studies (BES). His current research interests lie at the intersection of curriculum and pedagogical design and development and supporting learner mental health. In a grounded theory study rooted in lived experience and pedagogical journey mapping, he hopes to identify new pedagogical approaches that mindfully reduce or remove academic stressors that students invariably experience on their academic journeys in the hope of reducing challenges to mental well-being and improving academic success. Lawrence worked for 20 years in various increasingly senior leadership roles in Canadian colleges and universities as part of his career. He now lives in Lac la Biche, Alberta.