



# School Learning Enriched by Doing: An Apprenticing Model

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**Abstract** As an educator (Allison Balabuch) and an archaeologist (Ann Stahl), we consider how models drawn from archaeology, anthropology, and Indigenous principles of learning can help inform a shift from a “head” model of education to embodied learning through a Know-Do-Understand model. Learning in apprenticeship models has been an integral part of human history across the globe. Apprenticeship models echo Indigenous principles of learning, such as connections to place, relationality, and holistic, experiential learning. We also make a case for how learning through archaeology’s diverse and interdisciplinary subject matter can provide teachers with knowledge and skills to enrich formal classroom settings. By re-examining school pedagogy to consider models that include all of the learner—mind, body, and community—and through ongoing collaborations between archaeologists and educators, we can develop a more culturally inclusive and responsive model of education.

**Résumé** En tant qu’éducatrice (Allison Balabuch) et archéologue (Ann Stahl), nous examinons comment les modèles tirés de l’archéologie, de l’anthropologie et des principes d’apprentissage indigènes peuvent aider à passer d’un modèle d’éducation “par la tête” à un apprentissage incarné par le biais d’un modèle Savoir-Faire-Comprendre. L’apprentissage dans le cadre de modèles d’apprentissage fait partie intégrante de l’histoire de l’humanité dans le monde entier. Les modèles d’apprentissage font écho aux principes indigènes d’apprentissage tels que les liens avec le lieu, la relationnalité et l’apprentissage holistique et expérientiel. Nous expliquons également comment l’apprentissage par le biais de la matière diversifiée et interdisciplinaire de l’archéologie peut fournir aux enseignants des connaissances et des compétences pour enrichir le cadre formel de la salle de classe. En réexaminant la pédagogie scolaire pour envisager des modèles qui incluent l’ensemble de l’apprenant - l’esprit, le corps et la communauté - et grâce à des collaborations continues entre archéologues et éducateurs, nous pouvons développer un modèle d’éducation plus inclusif et plus réceptif sur le plan culturel.

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## Introduction

Archaeologists consider things through the long lens of time. Viewed this way, we can say that formal schooling is a very recent and novel approach to teaching children. Even more recent is the widely entrenched idea that learning happens best when children sit quietly, listen to what teachers tell them, and absorb content from classroom boards, screens, and books. In this model, knowledge is approached as something to be acquired and assimilated (Lave & Wenger, 1991, p. 52), with emphasis placed on conceptual knowledge (verbal, mathematical, or other) that “lives in the head.” This approach to educating young people took form in the cultural context of the nineteenth-century industrializing North and became universalized during the twentieth century. Not coincidentally, its global reach was extended through colonial networks, and it has come to dominate contemporary education (Gwekwerere & Shumba, 2021).

This educational approach is underpinned by a desire to acquire knowledge rather than to inquire (den Heyer, 2015), to jump through hoops rather than struggle through problem-solving. Despite successes attributed to it in preparing a subset of young people to participate in further academic pursuits, the approach disenfranchises and excludes many learners. One way it does so is through book-based knowledge that draws from an unfamiliar elsewhere—“A is for Apple” and “S is for Snow”—excluding those who do not share in its place-based referents (Ezeanya-Esiobu, 2017; Gwekwerere et al., 2013). A student in Canada would be able to make a personal connection to these examples; however, a student in Ghana would not. This globally dominant approach does not encourage students to learn from their surroundings or to build on the multi-sensory and embodied ways by which people acquire know-how and learn to solve problems. Students need opportunities to build their own knowledge and not simply read about an unfamiliar elsewhere. Moreover, this now-standard Western model ignores foundational ways through which humans have learned for millennia—through *doing* that involves relationships, experience, and place. We argue that involving students in authentic learning through doing is an effective way to address these challenges and that archaeology has rich possibilities for supporting heritage-based hands-on learning.

As an educator (Allison Balabuch) and an archaeologist (Ann Stahl), we explore how learning can be enriched through doing. We consider how models drawn from archaeology and anthropology as well as Indigenous ways of learning can help inform a better model of education. Apprenticeship learning characterized much of human history, and we make a case for how learning through archaeology’s fascinating and interdisciplinary subject matter can enrich what teachers do in formal classroom settings. Indigenous models of learning echo the principles found in the apprenticeship model such as connections to place, relationality, and holistic, experiential learning (Chrona, 2022; FNESC, 2006–2007; Snively & Williams, 2016). The “Know-Do-Understand” model that we discuss shares features with the kinds of learning that take place through apprenticeship and Indigenous models. We argue that apprenticeship has value as a source of “pedagogical ingenuity” (Singleton, 1998, p. 15), inspiring classroom learning by modeling some of its features. By providing students with opportunities to “do” through hands-on activities and infusing classrooms with pedagogy inspired by “apprenticing” practices, we create conditions for learning that involves bodies and minds. Immersing students in active practice deepens their experience and helps them to appreciate how people problem-solve in everyday contexts. Developing opportunities that encourage active, problem- and place-based learning helps young people to appreciate how relationships—with materials, things, places, other beings (human and non-human), and wider communities—shape what and how they know.

Our point is not that school learning has no value. It is rather that practices of school learning can benefit from enlivening its practices, for example, by modeling pedagogical patterns in which newcomers learn from teachers and peers alike through doing. In other words, there is value in taking inspiration from how learning occurs in situated contexts like apprenticeships—what Singleton (1998, p.8) calls “learning in likely places”—both formal and informal.

We begin with a brief discussion of how contemporary classroom education builds on an assumed separation of mind and body, after which we consider apprenticeship learning as a model that can help to enrich school learning in practice. Throughout, we draw on examples from Allison’s experience as a

middle school teacher and other contributions to this special issue to offer possibilities for how educators can draw on archaeology to enrich and enliven student learning through doing, both within and beyond the African continent.

### Problematizing an Academic Model of the Mind

Western philosophy has long stressed a separation between a “knowing mind” and a “useful body.” It is not surprising, therefore, that dominant pedagogy privileges language (words and facts), thinking, and the mind. In light of this widespread perspective on what counts as knowledge and how we acquire it, learning is approached as a “relentlessly cerebral activity” (Plath, 1998, p. 341). This obscures how bodily engagement with the world of things and wider environments contributes to what we know and how we know it. In the words of anthropologist David Plath, “it is as though the human body has been checked at the door and then left in the coat closet of scholarly attention. The result is a head model in which people acquire knowledge by some process of immaculate perception” (Plath, 1998, p. 342). Loveless (2019) asks us to examine this model in terms of what knowledge is valued and what is marginalized in this siloed system. She reminds us that we find more authentic knowledge when we are open to the relationships between subjects and disciplines, merging the arts and sciences while engaging minds and bodies.

This separation of “book learning” from “bodily learning” took form over the centuries leading up to the Industrial Revolution. Anthropologist Trevor Marchand (2008, p. 258–260) describes how Elizabethan England’s lengthy apprenticeships gave way to shorter periods of craft-based learning as industrialization took hold and factories replaced the small-scale workshops that had been sites for apprenticing. Training regimes began to privilege book learning, valuing theory over practice and diminishing an emphasis on “bodily immersion in ‘techniques’” (Marchand, 2008, p. 259). Examinations reflected this segregation, with theory and practice “tested” separately in training programs authorized by the state and trade unions. Not surprisingly, by the mid-twentieth century, English manufacturing was seen as suffering from deteriorating skills, leading to efforts

from the 1980s to rethink apprenticeship programs in ways that aimed to recapture the benefits of hands-on, experiential learning.

Although many in education have problematized the standard model of learning, school systems worldwide continue to maintain and defend it. This model not only leads to deteriorating or disconnected skills but also privileges a small portion of the population. It works to maintain systems of privilege because it maintains a narrow view of who has the qualifications to be an academic or a successful, prosperous citizen. Biesta (2016) describes this as schooling for “qualification,” “socialization,” and “subjectification.” Qualification here is not limited to a specific trade or role in society but includes “the many ways we become part of a particular social, cultural, and political ‘orders’” (Biesta, 2016, p. 20). Viewed in combination with how standard education elevates and universalizes the knowledge systems grounded in some places (the Global North) over others, the challenge of “qualifying” plays out on uneven terrain.

We can glimpse this terrain through the terminology that schools use to distinguish types of learning. They do so through what linguists call “marking,” which means they add a modifier to distinguish among forms. We mark things linguistically when we want to convey that something is different from, or perhaps a neglected subset of something else. For example, unmarked “history” refers (in theory) to everyone’s past, but the invisibility of some peoples’ history has led scholars to bring these to the fore through marking (e.g., “women’s history” or “Black history”). Examples from education include activities like “arts” education or “land-based” education. The marked forms stand apart from (unmarked) “education.” Prevailing practice in unmarked “education” privileges cognitive forms of knowing associated with didactic instruction as compared to embodied forms of knowing gained through “learning by the body” (Singleton, 1998, p.16) that typify some of these marked forms. In a similar fashion, embodied forms are often categorized as “extra” curricular, signaling that they differ in some fundamental way from (unmarked) “curricular” activities. This speaks to the differential value placed on didactic (curricular) methods over embodied (extra-curricular) ones.

A growing number of educators and interdisciplinary scholars argue the value of implementing “learning” curriculums over “teaching” curriculums (Lave

& Wenger, 1991, p. 97). The difference reminds us that we need to consider more than an endpoint of *what* students should know (what should be taught) to enrich the process of learning—*how* they come to know—and the value added of embodied or hands-on learning for understanding. The growing trend for creating spaces dedicated to “making” within schools as part of the “maker movement” expresses this growing interest in involving students in hands-on learning (Halverson & Sheridan, 2014). So-called maker spaces are today found across a variety of formal and informal instructional environments in the Global North—community facilities, libraries, museums, as well as K-12 schools and universities (Martin, 2015; Peppler et al., 2016). A makerspace “approach countermands historical, top-down knowledge transfer from master (skilled) to novice (unskilled), creating collaborative and exploratory learning spaces that encourage novices to regard themselves as having expertise to contribute” (Byrne et al., 2018, p. 40). These opportunities can (and should) be interwoven into everyday school learning rather than be treated as “special events” or “celebrations” after a unit of study. We argue that we can help students learn *through* rather than simply *about* Africa’s rich heritage by providing opportunities for Know-Do-Understand learning scaffolded by archaeology’s fascinating subject matter and in ways that need not require specialized spaces and difficult-to-access resources. Engaging students in inquiry-based Know-Do-Understand learning grounded in Africa’s past and the continent’s rich heritage can foster resilient learners and problem solvers within and outside Africa.

### Embodied Learning Involves Relationships

Effective learning happens when our understanding and our experiences are in constant interaction rather than when we merely internalize theoretical knowledge (Lave & Wenger, 1991). A learner learns best in *first-order experiences*—everyday practical experiences—rather than *second-order experiences*—descriptions of experiences (Laurillard, 2013)—in a “head model” of education. Embodied learning happens when a learner is immersed in direct and meaningful—authentic—experiences where they can connect the theoretical or the abstract with something lived (Nathan, 2022). These experiences are most

effective when they are social and involve hands-on engagement within an authentic learning community connected to learners’ real-world settings and problems.

Embodied learning involves practical experience and relationships with things. Consider familiar examples, like learning to ride a bicycle, play football (soccer), or play an instrument. We do not begin by *reading about* how to balance, dribble a ball, or strike a drum to produce a desired sound. We start by *doing* in relationship with things and materials. As we try, “mind” and “body” work together while engaging with things (a bike, a ball, a drum). The know-how and knowledge that emerges through practice is lodged not only in mind but also apparent in muscle memory and the coordinated, skilled movements of limbs, digits, and handling of materials and things. Things and our wider surroundings participate in this kind of learning, and our experience of them is changed in the process. We experience movement differently when we can ride a bike; we watch a football match differently when we know how to play; and we hear rhythm in new ways when we gain proficiency in drumming. This is what scholars call embodied knowledge (Marchand, 2008; Plath, 1998).

Learning also involves relationships with people and places. In other words, it is “situated” (Lave & Wenger, 1991; Singleton, 1998). It is a community activity, which, in Indigenous frameworks, is connected to the place where young people learn from their elders who share ways of doing (Cuerrier et al., 2015; Tanaka, 2016). It is a collective process where learners and teachers have important roles and responsibilities in relation to their communities (Chrona, 2022; Gwekwerere & Shumba, 2021; Snively & Williams, 2018). In our collaboration as an archaeologist and an educator to create *Learning From Our Past* school learning resources for the Banda region of Ghana in 2021–2022 (Balabuch et al., 2023), we built in prompts and opportunities for students to connect school learning with their elders and their community. These questions help learners value local knowledge and encourage young people to appreciate that knowing about their past can help them imagine solutions for current and future problems. For example, questions such as “Ask your elders about intercropping and monocropping” and “What ingredients and tools did

they use for cooking in the past?” help students better connect with how their ancestors used their scientific knowledge to grow and prepare drought-resistant crops (e.g., Logan & Grillo, this volume) and how they sustainably managed landscapes over millennia (e.g., Höhn et al. this volume).

These relationships form what Lave and Wenger (1991, p. 42) call “communities of practice,” which refers to groups of people who share ways of doing things. Lave and Wenger’s theory of learning stresses the relationship and interdependency of “agent and world, activity, meaning, cognition, learning and knowing” (1991, p. 50). Learning takes place as individuals (novices or new apprentices) participate in the community of practice through doing activities in a social context. At first, learners participate on the edges or peripheries of activities. More experienced peers (older apprentices) serve as examples and aid novices as they encounter problems. In this way, learning happens through the relationships among members of the community of practice rather than in a narrow apprentice/master relationship (Dilley, 1999, p. 40–41; Marchand, 2008). Lave and Wenger (1991, p. 35–40) use the term “legitimate peripheral participation” to describe this process of gaining knowledge through doing. “Newcomers” become “old-timers” through learning. Apprentices become masters. In the process, they move from the margins of a community of practice to become full participants in it. Through their actions, they reproduce the communities of practice of which they are a part, even as those practices may change. Learning is holistic and involves the whole person becoming a full member of the learning community and society.

Lave’s insights into apprenticeship learning come from her work as an anthropologist studying how young Vai and Gola boys learn to become tailors in Monrovia, Liberia. She learned that the apprentices did not start at a theoretical level. They began by accomplishing small tasks. They progressed by learning new tasks from the master tailor but also from co-apprentices who had more experience. Their learning process did not follow a map of making a garment from beginning to end. Instead, they learned to make trousers by starting with simpler finishing work and progressing to the more complex tasks of sewing and cutting. Through their apprenticeship, they learned to be master tailors at the same time as they were

learning “to make a life, to make a living, to make clothes, to grow old enough, and mature enough to become master tailors, and to see the truth of the respect due to a master of their trade” (Lave, 1996, p. 151).

Traditional school systems value learning that is separate from the authentic situations or contexts that humans find themselves in, such as a tailor’s shop. The philosophy behind this model is that through distance and generalization, learners can develop a global understanding of theories that could subsequently be applied to multiple situations—so-called *learning transfer* (Lave, 1996). Idealistically, this would be the most efficient model, but it is incongruent with reality. Throughout human history and still today, effective learning happens in informal settings or situations where the knowledge and skills being learned are grounded in the authentic context/place in which they are acquired (Chrona, 2022). In sum, rather than imagining learning happening through a *banking concept of education* where a teacher deposits learning and students’ only actions are to receive, file, and store the information (Freire, 2000, p. 72), legitimate peripheral participation draws attention to “a richly diverse field of essential actors and, with it, other forms of relationships of participation” (Lave & Wenger, 1991, p. 56).

### The Know-Do-Understand Model of Learning

Some formal school curricula, such as the British Columbia (BC) Curriculum in Canada (Province of British Columbia, 2023), are based on a Know-Do-Understand model, which encourages participation and shares features with artisanal apprenticeship learning. “Apprenticeship” is often associated with learning the skills of a particular field or career in a work or workshop setting, but we use the term more broadly to encompass any learning that occurs when novices try to mimic practices, manipulating tools and materials that may be new to them in order to do or make something. By engaging through gesture and feel, novices gain a new appreciation of the character of those tools and materials and encounter problems that must be solved.

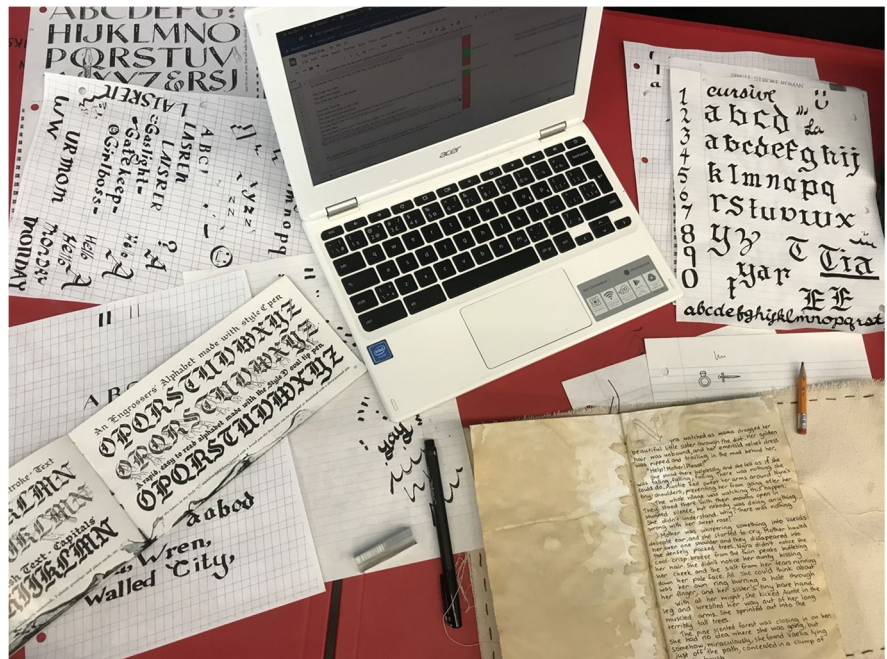
In a Know-Do-Understand model, a repertoire of skills or competencies (Do) and content (Know) are included to help learners build a deeper

understanding of a *Big Idea* or more overarching truth. A big idea, such as “Contacts and conflicts between peoples stimulated significant cultural, social, political change” (BC Grade 8 Social Studies), is accompanied with competencies such as assessing the significance of events and people as well as content knowledge about world history. A teacher might approach this through abstract descriptions of how things change when people came into contact or conflict with one another. As an example, students could learn about how technological innovations changed the way people produced written manuscripts by reading and evaluating historical sources. This would provide a second-order experience of how the invention of the printing press in Europe in 1496 or 150 years earlier in Korea transformed this process. However, when I (Allison) provided my students with opportunities to try their hands at calligraphy, to make paper, and to bind a book by hand, it provided them with a lived understanding of the time-consuming challenge of book-making before mass production technologies were invented and shared between peoples. The difficult process of writing with pen and ink results in inky fingers, splotches on the page, and no ability to correct mistakes with a backspace button. This experience is grounded in the learners’ past

experiences of the ease of writing on a computer or the forgiving nature of a pencil or erasable pen (Fig. 1). The challenges, and therefore importance of the invention of mass printing techniques, are felt in the body as much as understood on a “head” level. My students also included their own poetry or fiction in their handmade books, which created individual motivation to improve their writing skills and revise their work as they saw the handmade book as an “authentic” space. They did not want to spend the time necessary to handwrite their work if their work wasn’t something they were proud to share.

Unlike a theoretical approach that can be realized with one teacher, as master and holder of knowledge, and multiple students “receiving” the same knowledge at the same rate and speed, an embodied experience can only be successful through an apprenticeship model that is both situated and social in nature. Because a single master/teacher cannot meet the needs of multiple students learning at different rates and speeds, students take on the role of co-teachers and mentors in the community. Like the tailor apprentices in Liberia, students with more knowledge and experience helped their classmates. This is a different model than when a teacher asks a student to help a peer who is “struggling” or “behind,” setting up a hierarchy of who is perceived

**Fig. 1** Student work, practicing calligraphy and writing their own story into their handmade book from a draft done on the computer. Photo by Allison Balabuch



as a successful student in a classroom. Using an apprenticeship model, students can see that those who are mentoring and those receiving help shift constantly, creating a sense of value and capacity for all members of the learning community.

### Archaeology in Support of Know-Do-Understand Pedagogy

Archaeology holds great potential to scaffold learning that cross-cuts school subjects in relation to Big Ideas. As other contributions to this special issue make clear, archaeology helps us to appreciate and understand how people in the past met their everyday needs through a range of activities—making things, producing and processing foods, forging communities, shaping landscapes, and more. These are all things that people do today and which offer up possibilities for authentic learning, by which we mean learning that connects to real-world situations and problems. Archaeology lends insight into how people living in the past addressed challenges of daily living similar to those we confront today. For example, archaeology helps to understand how people in the past worked with materials like stone, clay, ores, or plant resources to make the things they needed (Bandama & Babalola, Höhn et al., Logan & Grillo, Wayessa, this volume). Archaeology and ethnoarchaeology (Wayessa, this volume) show us that there is no single way to do any of these things, and groups of people (societies) at different times arrived at different ways of doing the same things (technological style). These “technological styles” are learned practices that embody the knowledge systems of communities passed through generations. The skills involved in these practices are “unschooled” (in the sense of not learned through a formal school setting) but “highly developed through practice” (Singleton, 1998, p. 7).

Archaeology lends insight into how people living in the past addressed challenges similar to those we confront today through ingenious place-based technologies and materials. They developed and maintained vivid urban centers (Budka, Ward, & Elkins, this volume), extensive trade networks, and rich cultural practices (Haour & Moffett, Basanti & Mekonen, this volume). They built houses and made metals, baskets, containers, tools, ornaments, and more from

materials and resources drawn from their surrounding. Each of these technologies involves knowledge systems and associated styles that were transmitted across generations and communities, leading to the regional styles that archaeologists sometimes call “cultures.” When I (Allison) teach my students basket or textile weaving, it brings them into a relationship with these knowledge systems developed over time and place. It helps them to make connections between communities around the world and their local contexts, examining the similarities and differences in the technological styles. Through the hands-on, embodied learning of making a basket, it also helps them to connect with their local environments deepening their understanding of plant resources that are locally available.

Over the last century and more, many of these technologies and their associated know-how have been replaced by so-called modern conveniences. Plastics and industrial metals are replacing the locally made pottery that formerly dominated kitchens across the African continent (Wayessa, this volume), industrially produced textiles are replacing locally woven cloths (Balabuch & Rasoarifetra, this volume), and industrial iron tools have replaced ones made from locally and regionally smelted and smithed iron (Bandama & Babalola, this volume). Through hands-on learning involving weaving, basket making, and potting, my students have developed a deeper understanding of the time, skill, and effort that is required to make everyday objects. They have reflected on the waste inherent in today’s “disposable culture” and expressed a desire to care more for the objects in their lives. This helps them question practices such as single-use containers and fast fashion that are especially prevalent in the Global North.

Particularly in rural regions of the African continent, some of these endangered technologies continue to be practiced and some are the focus of documentation efforts through the British Museum’s Endangered Material Knowledge Programme (<https://www.emkp.org/>). The program provides funds to knowledge holders, practitioners, and scholars—including archaeologists and ethnoarchaeologists—to document “the making, use, repair and re-purposing of material objects, spaces, architecture, performances and environments” in collaboration with communities. There are currently more than 20 projects focused on endangered technologies in Africa, including gold

forging, metal smithing, potting, shell bead making, various fiber technologies (bark cloth making, raffia weaving, and rope making), textile weaving, leather technologies, animal tracking and fishing technologies (EMKP, 2023). Most of these projects remain in progress, but on completion, they will result in open-access digital repositories of images, descriptions, videos, and interviews with knowledge holders that will provide a potentially rich set of resources on which educators can draw in developing learning resources that support a Know-Do-Understand approach to learning.

A teacher does not need to be an expert in the techniques or have a large classroom budget to inject elements of Know-Do-Understand learning opportunities into the classrooms; even simple exercises can be a positive step in implementing a “learning” over a “teaching” curriculum. While engaging in the full range of activities associated with the above-listed practices is impractical, there is considerable scope to engage learners in scaled versions of practice, as Balabuch and Rasoarifetra demonstrate in the case of weaving elsewhere in this volume. While the scope for doing so clearly varies across contexts (e.g., urban/rural) and regions, teachers in Africa may also have the possibility to draw on skilled practitioners as resource people in developing strategies for engaging students in hands-on learning, with due consideration of Intellectual Property issues and appropriate cultural protocols (Mashoko et al., 2016). As an example drawn from our work in Banda District, Ghana, members of the Banda Heritage Committee were one

afternoon in 2019 having a conversation with potter Mary Yakosua about changes in potting practices over recent decades using a series of photos taken in 1994 as prompts. A small group of students on their way home from school paused to look at the photos, prompting a conversation about the differences between pots used to store water and those used for other purposes (Fig. 2). The students observed color differences and made reference to practices they had observed when they saw potters firing their wares. They drew inferences about why water-cooling vessels are not dipped in bark solution when removed from the fire when other kinds of pots are. They drew on bodily experience as they inferred that a pot’s porosity affected its performance in keeping stored water cool. The potter deftly guided the students in an impromptu science lesson, drawing on her practical knowledge of materials and their transformation through firing (pyrotechnology) as she helped them to develop a new appreciation of a technology deeply rooted in local heritage. Several weeks later, potters were enthusiastic participants in a heritage festival, and their demonstrations of forming a pot from the clay was a strong draw for school-aged children (Fig. 3). Finding ways to respectfully draw on the practical expertise of such community knowledge holders to support appropriately scaled Know-Do-Understand learning opportunities for students holds great promise to enrich and enliven classrooms, and particularly so in rural Africa.

A scaled activity in which students try their hands in relation to materials could be paired with

**Fig. 2** A group of students on their way home from school in Dorbour, Banda District, Ghana, gather in the courtyard of potter Mary Yakosua (standing in striped dress) in June 2019. Photo by Ann B. Stahl







**Fig. 3** Skilled potter Mary Yakosua from the village of Dorbour demonstrates how she forms the upper part of a pottery jar using a direct pull technique at a Heritage Day event (Banda District, Ghana) held at the Banda Cultural Centre in June 2019. Photo by Kelvin Asare

reflections in which learners ask what materials and tools we would need. How would we process the materials, and what techniques would we need to learn? Who can teach us? Let us consider the example of potting (e.g., Wayessa, this volume). Potting is a great place to embark on a hands-on learning experience as it provides multiple access points, regardless of the number of resources available to educators. I (Allison) have made air-dried pots with students with clay we collected locally, but I have also had access during my teaching career to a kiln to fire professional clays and experiment with glazing technologies. In all of these cases, the skill of constructing a small pot remains the same, as does the opportunity to experiment with decoration. For example, any materials locally sourced such as cones, cobs, or bits of rope can be used to experiment with roulettes as a

technique of pottery decoration (e.g., Haour & Manning, 2010; also <https://crossroadsofempires.wordpress.com/2011/06/27/african-roulettes/>).

In another example, following materials and objects through their histories (the “object biography” approach discussed by Haour & Moffett, Wayessa, this volume) provides rich opportunities for students to reflect on their worlds and the sustainability of contemporary practices. Where do materials to make the things we use come from? Where do the things come from? Do they get reused, and what happens to them when they are no longer useful? When I (Allison) start a new project, I share objects with students to help them access what they already know about a topic. These objects can be presented through photos if physical objects are not available. I have a small collection of metal items, glass bottles, and pottery that I have gathered from second-hand stores and my travels that I use to introduce archaeology as a theme in my classes. Students describe their object as accurately as they can and use their own background knowledge to try to identify where, when, how, and why the object was made. They then do some research to find out more information. I have a small cobalt glass bottle that was originally a Victorian-era poison bottle (indicated by the text “not to be taken” on the side). Students are surprised that it is a functional medicine bottle and not an ornament due to its beauty and craftsmanship. They also have the opportunity to reflect on the single-use plastic bottles we currently use for similar substances. Object biographies also help students examine their own positionalities and bias when studying the past. By examining their own predictions about the object, they reflect on their existing assumptions about history and the world.

When combined with a Know-Do-Understand approach, archaeology supports both learning about things and but also learning *through* them. Archaeology’s fundamental interdisciplinarity provides a rich place to create embodied learning experiences using the Know-Do-Understand model. For example, the object biography activity draws on math skills of measurement, writing skills to describe their object, reading and critical thinking skills when researching, and science and history knowledge to analyze the technologies and material composition of the object. Hands-on activities such as weaving and potting teach not only knowledge and skills but also perseverance (Balabuch & Rasoarifetra, this volume). Archaeology provides resources for thinking through present-day

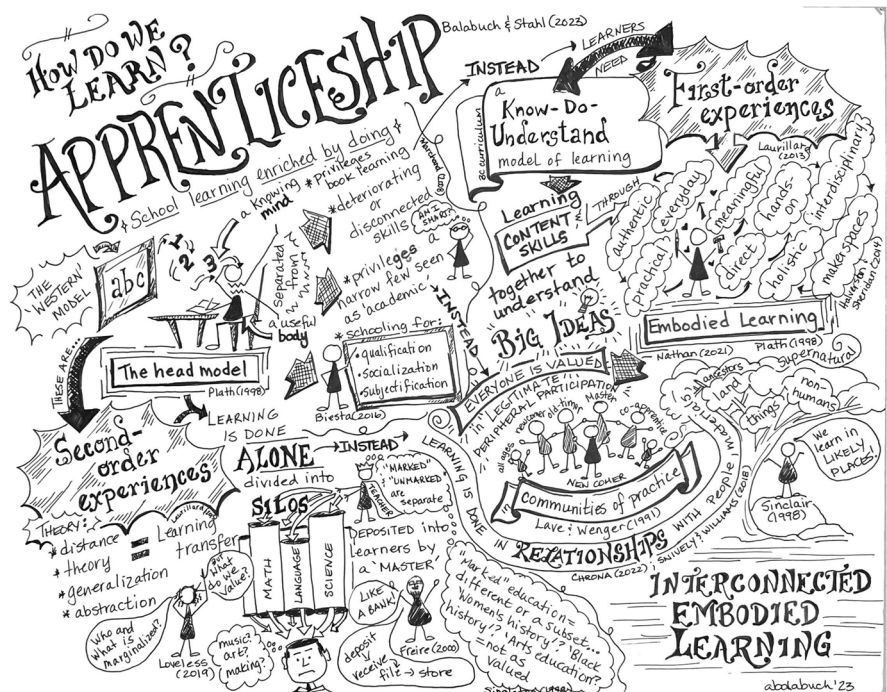
situations/dilemmas grounded in what students come to know about how earlier people solved everyday challenges in a sustainable way (Höhn et al., Logan & Grillo, this volume). For example, they can deepen their understanding of recycling as a process of recreation and reuse rather than a passive activity of putting a used object in a receptacle to be taken away. Glass bottles, such as the one used in the object biography activity can be crushed and remade into new objects such as glass beads (Bandama & Babalola, this volume). Broken clay items can be used as temper to make new clay pots (Wayessa, this volume). An object biography approach helps students to gain a new appreciation of how things like single-use plastics affect life on Earth as they continue to circulate in unexpected ways and places revealed through archaeological perspectives (Schofield et al., 2020).

**Concluding Thoughts**

By looking at models grounded in African and Indigenous philosophies such as apprenticeship, relationship, and communities of practice, we can develop a more culturally inclusive and responsive

model of education (Fig. 4). It is imperative that we continue to consider more closely what is taught in schools and how, to whom it is taught, and under what conditions (Lundy, 2020). Are we making choices based on the best pedagogy or to maintain the current status quo? As Hammond (2015, p. 14) observes, if we do not shift from a “book learning” or the “head model” in isolation, we will continue to have a “pedagogy of poverty that sets students up to leave high school with outdated skills and shallow knowledge.” At a time when people everywhere are grappling with the challenge of innovating sustainable ways to support life on Earth, Quality Education (United Nations Sustainable Development Goal 4) depends on finding alternative approaches to teaching and learning. We need to shift to a model that includes all of the learners—mind and body—and all of the relationships that form their learning communities. There is rich potential for archaeologists and educators to work together to develop resources to support learning curriculums that foster the skills and values that students need to address the challenges of today and tomorrow. Ongoing collaborations are vital if we are to deliver on that potential.

**Fig. 4** Interconnected embodied learning. Illustration by Allison Balabuch



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