TeachME PROFESSIONAL DEVELOPMENT
CEUs for Teachers and Educators

Hands-On Teaching and Learning

Introduction

As 21st educators, we are always looking for creative and innovative ways to engage our students in the learning process. One such way is hands-on learning? Hands-on learning and the tactile teaching techniques it requires are educational methods that rely on direct involvement from learners and educators alike. The main thesis of this type of educational tactic is simple: Students need to do something in order to learn about a specific subject effectively.

Teachers will need to put a significant amount of thought into constructing environments that help students learn in this way. For example, there needs to be a significant focus on rewarding learning experiences for students, so that students are motivated to participate in, and oftentimes lead these types of activities. Ultimately, it might be a goal for many educators to incorporate this learn-by-doing philosophy across all areas of their teaching curricula.

Section 1: Why Hands-On Learning and Teaching?

In this course, we'll discuss the pros and cons of hands-on learning, the science supporting this educational strategy, and effective ways to incorporate this type of strategy in a variety of common learning scenarios.

Before we get into that, however, it will be helpful to begin with a central definition.

What is Hands-On Learning?

First of all, there's another widely-known name for hands-on learning that you may be familiar with: kinesthetic learning. In this course, we'll refer to the central concept as "hands-on" learning, since we're always in favor of simple, effective language (Miriam, 2021).

Hands-on learning occurs when a student carries out physical activities or participates in physical projects to learn more about the subject material, instead of listening to a lecture. (In this way, it's somewhat similar to PBL, or project-based learning.) This form of learning falls under an umbrella of educational strategies known as "participatory" education (Miriam, 2021).

With a little thought and creativity, teachers can transform any traditionally lecture-based lesson into a hands-on learning module. For example, a few types of very common hands-on learning lessons might include (Miriam, 2021):

- Performing experiments as part of a science class
- Performing reenactments in history or literature class
- Solving tactile or real-world problems in mathematics
- Writing short stories or poems in English class
- Solving problems or playing strategy-based games in any class that requires critical thinking

As you can see, the possibilities are endless. What's more, hands-on learning helps strengthen abilities outside of simple recognition of subject matter based facts. For example, while completing the above activities, students might grow in creativity, communication, and critical thinking as well as in their knowledge of history, literature, or math (Miriam, 2021).

What are the Benefits Associated with Hands-On Learning?

Hands-on learning is associated with numerous benefits. While the advantages of this type of learning will be discussed throughout this course, some of the primary benefits include the following (Miriam, 2021):

1. **Students tend to retain more information when participating in a hands-on learning module.** Why? When students are working with their hands, experiencing sensations, and solving problems, that engages both sides of the brain far better than simply taking notes during a lecture. In addition, when a student is forced to use newly-acquired information immediately, that sends the information into a more practical part of memory storage.
2. **Students who learn through hands-on learning modules tend to exhibit increased attention spans.** This also makes sense, if you think about it: During lectures, students often tend to lose focus and tune out, perhaps paying more attention to how quickly the clock is moving than on the subject matter the teacher is introducing. With hands-on learning, students are up and moving. They're more interested in what's happening than they are focused on how quickly the class is ending. And, of course, with activities and projects, students

have to stay focused on the instructions the teacher is giving: If not, they'll miss a key step and be left to overcome a challenge on their own.

3. **Students have the opportunity to work together in teams during hands-on learning modules.** In lecture-based learning, students are not generally interacting with one another. When you throw an activity into the mix, however, students need to work together in order to succeed. Not only does this help create a community within your classroom, but this also mirrors the way that adults work together much more closely — preparing a student well for his or her later career.

4. **Students have tactile results to be proud of at the end of a hands-on learning module.** Although a stack of notes, quizzes, tests, and papers is certainly something to be proud of, it'll be much more interesting for children to take home, show off, talk about, and display the results of hands-on learning modules. For example, if you've asked your geometry students to put their skills to the test by designing and building a small piece of furniture from scratch, at the end of the semester, they'll have a brand-new stool to use in their home. Through this process, they would have received the help they need to ensure that these pieces are safe to use in addition to looking good!

5. **Finally, hands-on learning can make learning more fun!** If you asked students whether they'd like to sit and read a book, do some scientific calculation, listen to a lecture, or if they would prefer to go outside and collect insects to study, which do you think they'd choose? Peppering your lesson plans with tactile, hands-on activities will keep your students guessing, making it much more likely that they'll look forward to and enjoy their classroom experiences.

Is hands-on learning a strategy that can work for every student in every situation?

While we can't make a universal recommendation for every student, as all young people have unique learning styles and needs, hands-on learning is an educational strategy that has the capacity to be well-suited for students of many ages and different personality types (New School, 2022).

Even students who are shy, have low energy, or who prefer some aspects of more formal types of instruction (e.g., having clear instructions or a teacher as a guide to lead them through an activity) will likely benefit from having some type of tactile reminder or

interactive experience to rely upon as they go through their learning journey (New School, 2022).

Hands-on learning can be extremely versatile, as well. If an instructor is able to present a group of students with a variety of learning opportunities, each suited to a specific type of learning modality, then students can pick and choose activities as they wish to a large extent, as long as they're covering the primary subject matter. For example, if students benefit from listening to lessons, they can opt to listen to a lecture as they're completing an activity with their hands. Other students may prefer to watch a tutorial or read a paper as they're moving through a learning activity. Hands-on learning can therefore be incorporated into many different types of lesson plans, making it a viable option for every teacher to at least consider (New School, 2022).

Why is Hands-On Learning a Powerful Option?

Hands-on learning can bring any type of subject matter to life for children, which can help them get interested in a field of study or even help them realize that a specific subject isn't actually for them. Hands-on learning can help a student connect to the reality of a less-tangible subject matter; for example, completing volunteer work or putting together a proposal to help people on the other side of the globe will add another level of realism to, say, a social studies class — more realism than reading any textbook or story will be able to offer (New School, 2022).

Many of us have been able to experience the benefits of "learning by doing" with our educational experiences. After participating in biology labs, future scientists are more sure with their hands and more confident about the theories they want to experiment with. After an auto shop class, future engineers are better equipped to understand how motors work — which could better help them better recognize the way we think about energy in the future (New School, 2022).

In more traditional learning frameworks, students spend years (close to a decade, even) steeping themselves in theory before they actually put their knowledge to use. In hands-on learning, students are becoming involved in a practical way with the real nuts and bolts of their chosen field from an early age. This can help them be more interested, more focused, and better able to create, years later, when they do launch their own careers. As it turns out, there's a deeper level of learning that many students can unlock only when they invite their senses into the learning experience. As it can be difficult to make reading or listening to a lecture a fully experiential thing, concentrating on

weaving at least occasional hands-on learning activities into a lesson plan can add variety and power to virtually any subject (New School, 2022).

Importantly, hands-on learning does seem to confer these benefits regardless of the type of classroom this strategy is used in. As remote learning and virtual learning are becoming more popular options, more and more teachers are figuring out effective ways to help distance learners join in the hands-on fun. We'll discuss the ways you can help make this happen in a later section of this course (New School, 2022).

Hands-on learning is also powerful because it gives students a more accessible way to self-correct. Often, when students are learning something primarily theoretically, it can be easy to misunderstand or misinterpret central facts and theories. It can also be very easy to confuse different high-level concepts when they're all grouped together on one page — for example, specifics of the three laws of thermodynamics, or the various sections of the United States Bill of Rights may overlap as a student is trying to retain this information (New School, 2022).

When students are given the opportunity to familiarize themselves with these concepts individually and through engaging activities, a set of concepts or laws that easily blurs together becomes much more distinct. An easily-misunderstood theory becomes much simpler to understand. If students realize that they're confused about something, when they're working with something tactile or manipulable, it becomes much simpler to identify and verbalize what's standing in their way (New School, 2022).

Finally, when you delve into the way that children's brains develop and hold onto memories, the type of memories that are created when a student smells, touches, makes or even sees something unusually vibrant are much stronger and easier to reference than the memories a child makes when he or she reads a book. Shifting to hands-on learning becomes a deviation toward more efficient learning — learning that truly sticks in children's brain better, allowing them the opportunity to learn in a more permanent and helpful way (New School, 2022).

How does Hands-On Learning help students build toward a career?

With its heightened focus on practical learning and hands-on experience, hands-on learning is possibly far better suited for helping students build workplace preparedness than more traditional learning (New School, 2022).

Traditional learning and education don't tend to translate perfectly into the way a child would practice a related craft down the road. For example, think about the way that

students might learn to mispronounce a word or may learn an incorrect meaning of the word in a self-learning environment. They read a word over and over again, perhaps are given a written test on a subject that uses that word — but they may never actually use or speak the word aloud themselves until asked to do so in a professional capacity. It is only then that the individual learns the correct pronunciation and the true meaning of the word (New School, 2022).

In hands-on learning, students, in theory, can get many of these mistakes out of the way before they're asked to practice a skill with responsibility attached. For many fields, this can make a world of difference. For example, in medical studies, manufacturing, and architecture, little mistakes that are borne from inexperience can be significant. Students who have gone through hands-on learning will still make errors, of course; that's the nature of humanity. However, it stands to reason that, because they'll have meaningful practice and hands-on experience prior to graduation, they'll make fewer mistakes. This is the same general idea that underlies the importance of medical internships and residences prior to a medical student's licensure as a professional doctor — just taken to even more pervasive and helpful levels (New School, 2022).

Not only will it help the future workplaces of students who have gone through hands-on learning, but this type of learning will also serve the individual students better, as well. Often, there is a stark amount of competition for high-paying, enjoyable jobs — the types of jobs that often require a great deal of experience and familiarity with usually learned-on-the-job skills (e.g., doctor, engineer, even musician or artist). Students who have been working in and practicing in their fields of choice, even sporadically, from a young age will have a better chance of standing out from the competition and securing the career or project of their dreams (New School, 2022).

How well does hands-on learning transfer from the classroom to an office workplace?

One question facing educators is whether or not the long-lasting benefits of hands-on learning impact all types of careers, including those that require less skilled handiwork. For example, will hands-on learning still help a student who will later get a job in a more analytical, theoretical field?

It would seem so. While the actual subject matter of hands-on activities may be less strictly applicable, the way a student learns to receive and apply knowledge will help that individual later regardless of the type of career chosen. Think about it: In the real world, people are given problems to solve, asked to create proposals and develop

creative solutions, to think outside the box, and to prepare presentations that will resonate with their audiences. They're asked to do things; for the most part, that's what a job entails (New School, 2022).

Hands-on learning, with its focus on performing tasks instead of passively taking in information, fortifies students' mindsets and helps give them the expectation that they'll be tackling projects and doing meaningful, tangible work on a daily basis. Regardless of the subject matter, training students to ace multiple-choice quizzes doesn't have much future-proofed benefit. However, teaching students to walk into a new environment, assess what needs to be done, jump in, get their hands dirty, and make mistakes until they get something right—that's a much more versatile skill, and one that employers in a range of fields will seek out and reward (New School, 2022).

Further, there's a good chance that students will be able to list many of the accomplishments they gain from their years in a hands-on learning environment on their resumes - which will, of course, further boost their competitiveness among their peers when applying for jobs. If job seekers are able to report that they have worked with a specific computer program several times a week, took a class that required the use of a specific tool, did a certain amount of volunteer hours, led a team of students as they completed a specific project, or solved a specific problem using only a certain set of materials, that will look good to future employers (whether for a job or an internship — or to future schools) (New School, 2022).

How else does hands-on learning benefit students?

As educators, we naturally want to ensure that our students benefit from our teaching methods in many ways. It's great to help them with skills to enhance their job prospects, but we want to also teach them in ways that help them become happier, more empathetic, and more forward and logically-thinking individuals (New School, 2022).

For teachers and students alike, hands-on learning offers more opportunities to problem-solve, connect with peers, and enjoy more active learning sessions than more traditional lecture-based strategies. Hands-on learning should result in fewer restless participants, as students will be receiving more stimulation during the class hours themselves. Students should also feel more excited and happy about the prospect of learning; instead of resigning themselves to an hour of taking notes, they get to figure out how to redesign a museum, or they can practice cooking a different type of food. This novelty can do wonders for a student's level of engagement and mental health (New School, 2022).

How can I prepare my students for hands-on learning?

Pivoting from traditional lecture-based educational methods to more interactive hands-on learning can be challenging for many students. In order to help them prepare, consider assisting your students in the following ways (New School, 2022):

1. Help students become familiar with the safety procedures relevant to the specific type of hands-on learning prior to starting a new type of project or skill. For example, if you're going to be leading your students through a shop class where specific types of power tools are used, devote an entire class period while you're still in your classroom to the proper care and use of those power tools (and then make sure trained adults are nearby when students are using those tools at all times).

2. Equip students with the personal protective equipment that they need in order to complete their new projects successfully, and ensure that they know how to use each piece of equipment.

3. Giving your students hands-free ways to take notes (e.g. recording functions on their computers or tablets) so that they don't have to take off gloves or put down tools to record important concepts for later use can be very freeing and empowering.

4. Emphasize the importance of a clear mind as students learn new skills — for example, take the time to explain the connection between enough sleep and a good diet and having enough energy to tackle new activities. Additionally, make it clear that hands-on learning periods will likely require more physical endurance from students than the typical lecture-based class.

How does hands-on learning work for groups of students?

Hands-on learning can benefit individual students by empowering them with new skill-sets, but as importantly, since teachers are rarely in a scenario where they're only teaching one student at a time, this type of learning can work well for groups of students. Students can also benefit in many ways from working with their peers, as they develop communication, presentation, and cooperation skills from working on activities with other students (New School, 2022).

When you're structuring your hands-on learning activities, build variety into the different ways that you'll be guiding students to interact with one another. For example, one

lesson might have a competitive edge to it; in another, the interaction between students might be decidedly more cooperative. If a specific hands-on activity is more solitary in nature, you could bring together students at the end of a class to discuss how the experience went, or to brainstorm better ways to tackle a particular problem. If you have a large class of students, you could even group your students in pairs or small groups of three where they can take turns and help each other complete a certain activity together (New School, 2022).

Section 1 Key Points

- We can define hands-on learning as a series of physical activities or tactile projects that a student embarks upon to learn more about the subject material. More widely, hands-on learning depends upon interactive, engaging educational actions that require the student to be an active participant in their learning journey.
- There's a neurological rationale for the importance of hands-on learning. When students work with their hands, solving real problems and experiencing real sensations, that engages their brain far more than taking notes or watching a video.
- Hands-on learning can help groups of students learn subject matter and enjoy opportunities to grow their communication and presentation skills.
- Hands-on learning can help students bolster their resumes and become more competitive in the job market. They may, for example, be able to say that they've worked on problem-solving or with a specific tool for years. That's hands-on experience that a future employer or further educational opportunity will like to see!
- Hands-on learning can be leveraged for remote students, as well, through EdTech, remote activities, and strategically planned community involvement.
- Hands-on learning also helps prepare young people for the realities of their future careers, where they'll likely be asked to experiment with unfamiliar variables, tackle projects, and complete real objectives on a day-to-day basis.

Section 1 Summary

It's clear that hands-on learning presents valuable opportunities for students to gain educational experiences, build relationships with their teachers and peers, and cement

meaningful skills that they can use for the rest of their lives. Additionally, it does seem that hands-on learning is increasingly popular even for remote and virtual learners.

However, much like any other type of educational practice, hands-on learning must be implemented strategically in order for teachers and students to enjoy the related benefits. In the second section of this course, we'll discuss how a teacher might leverage hands-on learning to the best possible effect.

Section 2: How to Implement Hands-On Learning

Now that we've discussed the basics of hands-on learning, it's time to discuss how best to implement it in your classroom if that's a goal for you and your team.

Implementing hands-on learning in early education

Hands-on learning works well for young and old students alike, but there are different considerations that you should think about in both cases. When you're helping your students in kindergarten and elementary school get used to daily education, keeping them engaged is key. That's one way in which hands-on learning can provide a great deal of motivation and excitement (Lynch, 2019).

Hands-on learning is very beneficial for young students because it helps them engage with and start to understand new concepts using different parts of their brains. This can not only introduce them to the subject matter — it can help them discover how they learn, which is invaluable information (Lynch, 2019).

If you're looking for ways to implement hands-on learning in early education, it's a good idea to start by thinking about the way you set up your preschool classroom. One school of thought involves getting rid of the big furniture — chairs, tables, desks, and the like — in rooms that are geared to support the very youngest of learners (e.g., preschoolers). Instead, the room should consist largely of open space, and there should be a variety of objects around for young students to use and manipulate (think: modeling clay, buckets of water and low sinks, finger paint, crayons, pipe cleaners, and building blocks) (Lynch, 2019).

With all of these materials within easy reach, the teacher could begin a learning period by sitting on the ground with children and asking the students how they might use the objects around them. The teacher should refrain from telling the student how to use a pipe cleaner or blocks, or even showing the student how they might be stacked. Rather,

the teacher should focus on allowing the student access to the central joy of hands-on learning: That of discovery (Lynch, 2019).

This is very different from current trends within early education. Many schools are focusing on having extremely structured classrooms and formal types of learning strategies, even for the very youngest students. While many may argue the practicality of this type of educational strategy when employed from an early age, others believe that this simply isn't the best way for very young students to learn and discover (Lynch, 2019).

Instead, preschool children should be guided freely in exploration, and allowed to move around an enriched environment as they see fit. It may seem like they are simply playing with provided materials, but in actuality, they are using their senses to learn about the world around them. They are learning how to be curious and cementing the foundation of their critical thinking skills (Lynch, 2019).

Crucially, these young learners will start to learn about the process of trial and error. For example, the simple process of building a block tower can become an experiment with a hypothesis and a conclusion. "What if I build the tower this way," a young learner might think, before executing the experiment — building the tower. Whether the tower stands tall or falls tells the young learner a great deal, whether subconsciously or not, about the way objects work together and about trial and error. Moreover, that framework of proposing a question, completing an activity, and logging the result for future reference is an invaluable one that tends to be more effective when student get there on their own (Lynch, 2019).

How can hands-on learning be implemented for older students?

We know that guided or unguided play with paperclips, pipe cleaners, and blocks is great when you're working with very young students. However, when your students are in middle or high school, you may find that these types of craft- or play-oriented activities aren't enough to keep the older learners stimulated and engaged. However, when you're working with older students, the principles of hands-on learning can be incorporated in creative and meaningful ways?

Here are some practical strategies to consider implementing (Ditch That Textbook, 2021):

1. **Have your students get their hands dirty and/or get up out of their chairs.** While this is a little bit of a literal take on 'hands-on' learning, it can be really helpful to

help break students out of a learning rut — particularly older students who have come to expect long lectures or lengthy reading assignments as the primary educational methods du jour. Instead, clear a circle in your classroom and make a mess on the floor — whether it be of cooking ingredients (to talk about the chemistry behind baking) or flashcards or a large floor game. Anything that physically gets the students out of the 'just sit down and take notes or read' mold will instantly be more memorable and induce more brain activity than more typical teaching strategies. While it may not be possible to do something like this every class period, it can be particularly effective for helping students "get" a concept they've previously been struggling with.

2. **Make sure to spell out a concrete, real-life connection for everything that a student is learning — as much as is possible.** If you aren't able to make a concept physical and tactile, that's okay. That may depend on your budget or the amount of time you have to sink into a certain lesson or concept, and the resources aren't always there. Providing context and connections for the things you're teaching your students, however, is quick and free. Doing so may seem redundant or unnecessary to you, but helping your students figure out where they stand in relation to a specific subject will help them order it within their worlds.

3. **Ask your students to become engineers, designers, content creators, or reporters — anything that will force them to look at the information they're learning in a functional or useful way, instead of simply as data to retain.** Right now, there's been a huge swell in focus on the maker movement — asking students to make things with their creativity and newly-acquired knowledge — as well as in functional design thinking. These types of project-centered learning activities are very good for the brain and can help students of all ages be more focused on their studies. Instead of giving your students a problem set in mathematics, for example, ask them to design a new playground for your school within a certain set of financial or geographical restraints. That type of problem will require a great deal of mathematics calculations, and will also help your students retain the information for longer than rote memorization.

4. **Introduce the idea that in real life, data often doesn't make sense.** Often, when we present problem sets and stories to students, we cleanse the data and work the problems specifically so there are never any inaccuracies — and there are always simple, clean, easily-findable answers to any given problem. Of course, in adult life and on the job, this is rarely the case. After you've had your students

work through a few geometry or physics concepts in a safe, clean data environment, have your students work with real data — or create problems for each other to solve that may not necessarily have simple or correct answers. Ask your students to determine whether the problems are solvable, and provide their reasoning if they don't think they are. This is far more interactive and experiential than a simple problem set, and it gives the students far more responsibility and ownership of the way they take on the given problems.

5. **Ask your students to teach other students.** As an educator, you know full well that you need to understand something really well — inside and out — in order to teach it effectively. The way you look at subject matter if you know you're going to be presenting it to others and answering their questions is just different. Take turns asking your students to partner with you in the presentation and education process. For example, in a given semester, all students could have a week where they are the one championing the subject material for that week. Your students will know that you're there to help them, of course, to make this experience as low-stress as possible; but they can be the ones coming up with games for the class to play, initiating class discussions, finding videos and resources to reference during classroom presentations, and more. Not only will all students know their specific part of the subject extremely well, but this will also help students learn communication, presentation, and project organization skills that otherwise would have been left on the table.

6. **Try the same hands-on learning strategies used for younger students — just aged up for an older audience.** Earlier, when we discussed ways to implement hands-on learning for young students, we discussed strategies like leaving blocks and pipe cleaners out, refraining from telling students how to play with them, and letting the students discover their own methods for learning and playing in the intended environment. Allowing older students to do something similar can be both cathartic and productive. Consider leaving times open in your curriculum or lesson plans to allow students free time to discover what they will — either in an open-ended way or in a closed, safer arena. For example, you could give your students access to microscopes and ask them to tell you whatever they can about the types of fabrics they're wearing in the room, or you and your students could set up a working fish tank in your classroom so they could observe the nitrogen cycle in action.

7. **Make sure that your classroom is a safe place for students to fail.** With hands-on learning, it's easy to see that the often-circuitous route a student takes to learning new material is part of the journey. (Picture the toddler building a tower of blocks, above — they have to know it's okay for the tower to fall in order to feel confident building it back up!) Older students need to know that it's okay to have a hard time building the aquarium, figuring out a new kind of problem, or putting together a presentation that their peers will actually enjoy. If they don't operate within a safe-to-fail area, they'll tend to be conservative, instead — making it much less likely that they'll experience the thrill of discovery, and much less likely that they'll actually get comfortable with the material they're working with. Every class will have to include some kind of assessment, but make sure that the projects and activities in between higher-stakes assessments leave room for students to play around, try again, and grow. Their learning will be much deeper because of this!

How does hands-on learning transfer to higher education, the workplace, and the real world?

Hands-on learning may sound great in theory, but since one of our primary goals as educators is to help students get ready for life in the real world, we must ensure that we are using this type of learning in a way that prepares young students for what's out there

As it turns out, hands-on learning can enrich higher education and transfer to career and adult life in many practical ways, including the following (Lerna, 2020):

1. **Work placements, internships, and practicums.** Internships are already a way that students in college and new to the workforce can practice hands-on learning. In internships and other similar programs, older students have an opportunity to practice what they've been taught in a professional environment — and learn more real-world lessons along the way. While for many students, internships are one of the first opportunities they have to practice their academic skills in a work setting, and for students who have benefited from project-based or hands-on learning from a young age, this type of experience will be very familiar.

2. **Training programs for professional accreditation.** Often, before future professionals can become doctors, lawyers, nurses, or psychologists, students will need to complete a certain number of work training hours in their intended career environment (e.g., a hospital). This is a specific type of hands-on learning

that will help prepare those students to do well in specific work environments once they've achieved their certifications.

3. **Undergraduate research.** If students are in pre-medical or pre-PhD programs, they will likely spend at least some time in their undergraduate studies working under a principal investigator (or PI) in a research laboratory. This also applies to students who aren't in the hard sciences; for example, a student might do research as part of art history or an abnormal psychology program. In taking on undergraduate research, students both gain a deeper understanding of their chosen fields and an idea of what real life in their chosen profession might be like.

4. **Volunteering and fieldwork.** Formal internships, work placements, or funded undergraduate research aren't the only ways to get hands-on learning opportunities. Depending on your field, you can find valuable experience through volunteer work, shadowing a professional, or by helping nearby labs or offices with any needed fieldwork. Typically, volunteer and fieldwork may be done "out in the world," e.g., in actual fields or forests—or by conducting polls and surveys on city streets. Older students may be able to help contribute to their professions by finding a volunteer position related to the field of their choice.

Section 2 Key Points

- Teachers who wish to invest in hands-on learning might start by setting up their classrooms a little differently. An emphasis should be placed on open spaces and numerous fun, brightly-colored, tactile objects.

- Preschool children in particular should be guided in exploration instead of told how to play. This helps young children learn how to be curious, which in turn may help cement their sense of discovery and their critical thinking skills.

- Don't have the time or resources to invest in a completely updated curriculum or learning space? You don't have to. Instead, you can help your students benefit from some of the benefits of hands-on learning by providing as much real-world context as possible. Children are inherently practical people, so giving them a funny, relatable, or dramatic contextual reason to connect and care about the material can have an instant effect.

- If you're able, consider tapping into any nearby makers' spaces or communities. Or, ask your students to become hypothetical engineers, consultants, or rocket scientists. This can enable you to ask your students very clear-cut questions and

pose very specific, practical problems to solve based on the relevant subject matter.

- Consider giving your students problems with no clear, defined, or clean answer. Often, in real life, there is no absolute or obvious answer to a question or problem. Allowing your students the freedom to derive imperfect answers from messy data is much more realistic than the alternative.
- Consider asking your students to take turns teaching each other subject material — or asking students to be your "teaching assistant." Presenting and discussing a piece of information works different brain muscles than simply taking information in passively.

Course Summary and Conclusion

When it comes to hands-on learning, a little can go a very long way. Finding imaginative ways to help children think about a subject more interactively and practically can help them use their brains in different ways. It can also help them unlock specific skills that will help them for the rest of their lives. Consider taking just a few steps toward hands-on learning in your upcoming lesson plans. Whether you're able to reimagine your entire curriculum or just take an afternoon to help your students work through one specific activity, you may be surprised by just how many benefits you and your students will experience.

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