Learning in Motion: The Impact of Movement on Young Minds

Praxis Project Thesis: Submitted in partial fulfillment of the requirements for the degree of Bachelor of Arts — as part of the Community, Youth, and Education Studies Major at Clark University

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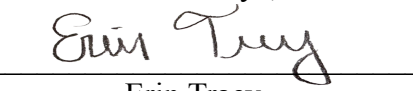

Erin Tracy

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Acknowledgments

Throughout my time volunteering, I thought it was going to be a lot different from what it actually was. I thought I was going to be doing a lot more observations and just sitting and watching, but the teacher I was volunteering for was very lenient and open to me interacting with the students, helping them with their work, and also leading some lessons. Being able to do that, I really got a sense of what it felt like to be in a classroom and interact with students in an academic setting. I've always done summer camps and a lot of outdoor work with kids rather than being with them in a classroom. Being able to have those classroom interactions really helped me to understand what it was going to be like when I started the MAT program and what teaching students is like in general. I've grown very fond of the students, and I'm definitely going to miss them a lot. They have helped me so much through all of my work. The same is true with the teacher for whom I was volunteering. She has pushed me to do so many things that have impacted me in such a positive way. She's always been there to support me, and whatever I have needed, she's always made time and space to chat with me and look over my work, and I can never have asked for a better teacher.

Abstract

This project examines how movement impacts elementary school students who don't have access to recess outside every day. To understand the impact that movement has on these students, I collected data by observing a third-grade classroom and taking field notes, and by conducting interviews with teachers at Apple Academy to learn more about their classroom experiences and how their students interact in their classrooms with and without outdoor recess. I then created a lesson plan that incorporated movement within lessons throughout the school day, encouraging students to expend energy. Research shows the positive impact movement has on elementary school students and the connection movement can have within lessons in curricula. These findings demonstrated the importance of having students within elementary schools move during their day and how that can greatly impact their academics and ability to participate in classes.

“Chloe Focus Venkitachalam”

Throughout my elementary and middle school years, my parents would refer to me as “Chloe Focus Venkitachalam.” This was because I couldn't seem to focus on anything when it came to doing homework, reading, or even eating. I always seemed to be in another world and thinking about something else, rather than staying on task and present. This very much negatively affected me throughout my academics because I couldn't focus in class, I wasn't paying attention to lessons, therefore I wasn't really learning, and when it came to taking tests, I couldn't remember any of the material, so I tended to do pretty badly on those overall. One thing that really helped me was movement. It started small, with going on breaks with my teachers, walking around, having fidgets, and then grew into something bigger, where sports aided me in my academics and kept me focused. Thanks to movement and especially sports, I was able to perform much better within the school system.

Though it ended on a good note, the path there was very tough. I had a lot of teachers just tell me I wasn't trying hard enough and that I just needed to focus and stay on task, when that sometimes felt literally impossible. Because of that, I always thought I was a bad student. There were so many times when I wished I could be like every other kid, and all I wanted to do was focus, but my body physically couldn't, and I never understood why. I always thought there was something wrong with me or I was broken because my sisters never had this problem, my parents never seemed to, and all of my friends didn't understand what I was going through. Being able to move in and out of the classroom allowed me to improve my academic performance. I not only learned how to take care of myself in the classroom and do well on assignments, but it

also helped me in all the spaces I inhabited, even beyond the classroom, and it changed my life for the better.

This is a challenge that a lot of students face in elementary school. Lack of movement impacts students all over, and it is something that is not talked about enough. Throughout schooling, especially in elementary school, students must be able to move their bodies to be able to let out energy and to also interact with others during times of movement. By constricting movement, it can cause students to lack focus within the classroom, disrupt others, and ultimately dampen the impact of their education through a lack of ability to move their bodies throughout the day. There are a lot of times when people don't understand the impact of movement on students because of the different types of students, but there is a large majority of younger students in elementary school who thrive when they get movement, and their education and academic standings increase when they can move their bodies.

I chose to look into this topic at at Apple Academy[1], an Elementary School in Main South, Worcester, which has a particular way of doing recess. They are unable to have outdoor recess every day due to a lack of space outside, and they don't have a playground; they have a fenced-in pavement area where students can run around. I intend to focus on the students and how movement impacts them throughout their academics, their social life, and, generally speaking, what it is like when they have indoor versus outdoor recess. Throughout my time at Apple Academy, I took field notes and observed classrooms to see the impact of indoor versus outdoor recess and how students interact with each other and their academics when the recess is

[1] The names of the school, teachers, and students are all pseudonyms.

different. I started with observations, then moved into looking at artifacts and documents to be able to get a sense of the school and how they plan out their lessons, if there is movement implemented in their lessons, where it is, and how they might facilitate that within their classrooms. Looking at their lesson plans gave me an understanding of their routines, what teachers can do within their classrooms based on movement, and also when scheduled breaks, recesses, and lunches are, to get a sense of when students have free time throughout the day. After looking through artifacts and documents, I then interviewed three teachers within Apple Academy to help me answer my research questions, which are: What are the benefits of movement within the classroom? How does it positively impact students? How is movement included in schools' curricula? What are ways to increase movement in classroom instruction? And, how could existing physical movement programs be improved within city schools to increase the amount of physical movement students are allowed? Throughout my research, I aimed to understand why movement is important, and its impacts, understand how current teachers feel about movement in their classrooms, and what they would change, and see how I can create a lesson plan that encompasses movement productively and safely.

Review of Literature

Movement in elementary school classrooms has changed over the years, moving from something that was not addressed to something that educators and researchers now see as essential to young learners (Blakemore, 2003). For elementary-aged students, who are in a critical stage of cognitive, social, and physical development, movement is not just a break from

learning — it is an important part of how they learn. The way teachers implement movement has changed based on available resources, the structure of the school day, and how movement can be woven into the curriculum in ways that still meet academic standards (Blakemore, 2003). What has stayed consistent across the research, however, is that movement has wide-ranging positive impacts on elementary students, impacting their academics, their social relationships, and how they personally experience school (Institute of Medicine, 2013).

At the core of why movement matters for elementary students is the idea that the body and the mind are not separate — they work together in learning. Barsalou (2008) talks about this through the concept of grounded cognition, arguing that cognitive processes are deeply rooted in bodily experience and sensory perception. For young children, especially, this means that abstract ideas become more accessible when students can use their bodies to engage with them. Gallagher (2005) expanded on this, showing that how a child physically experiences the world shapes the way they think and reason, and Varela, Thompson, and Rosch (1991) further argued that cognition itself cannot be separated from the lived experience of having a body. This is especially important when thinking about how elementary classrooms work, because children at this age are still developing the neurological and cognitive parts of their brains that will support their academic learning for years to come. Goldin-Meadow (2011) also found that physical movement plays an active role in how children process and retain information, not as a side effect of learning, but as part of the learning process itself. When elementary students are allowed to move while they learn, they are not being distracted from the content — they are engaging with it more meaningfully.

The Benefits of Recess

Academic Benefits of Recess

One of the most looked at and important forms of movement for elementary students is outdoor recess and unstructured physical activity. Pellegrini and Bohn (2005) found that recess plays a meaningful role in children's attention in the classroom and how they interact with their academics, with students showing better attention and focus in the classroom after having time to play. Hillman et al. (2014) similarly found that physical activity has a direct impact on brain function, in areas like attention and memory, which are foundational skills for elementary learners who are building these skills for the first time. Ramstetter, Murray, and Garner (2010) argued that recess is not a privilege but a necessity, talking about points that children with regular recess do better academically and behaviorally than those without it. The Centers for Disease Control and Prevention (2010) also showed a clear connection between physical activity and academic achievement, saying that more physically active children tend to have better grades and stronger engagement in the classroom. For young elementary students who are still developing the skills to focus while in the classroom over long stretches of time, Howie and Pate (2014) found that students' behavior and improvements within the classroom are greater following recess, saying that unstructured movement is not competing with learning — it is making that learning better for students. Fedewa and Ahn (2011) backed this up by finding a constant positive relationship between physical activity and children's attention across more than just one area of study.

Behavioral Benefits of Recess

Looking past academics, recess and movement have a big impact on how elementary students control their behavior and develop socially. Barros, Silver, and Stein (2009) talk about how students with more recess show better group classroom behavior and are more attentive than students with less recess. Pellegrini and Davis (1993) say early on that this relationship is not accidental, and children need the release that comes from free play in order to return to the classroom ready to focus and do their work. Rhea et al. (2009) also talk about this, saying that the impact of recess extends beyond getting rid of energy, with students who move during the school day also showing an easier time controlling their emotions and a better ability to go through transitions back into the classroom. For elementary students, these skills are critical because they set a foundation for how they learn to work in group settings. Pellegrini (2005) talks about how recess is one of the few times during the school day where children get to practice social skills, learn how to talk to one another, learn boundaries, and make friends. These skills cannot be easily learned through structured academics (Blatchford, 1998; Pellegrini & Smith, 1993).

In-Classroom Movement

Academic Benefits of In-Class Movement

Movement within the classroom itself is important, and the research shows a growing understanding of this. Action-driven learning has become more common because it allows students to have hands-on materials and a space in the classroom to experience it in a way that involves their whole bodies (Donnelly & Lambourne, 2011). Alibali and Nathan (2012) talk about how embodied cognition plays a big role in mathematics learning, with students showing

stronger understanding when they used gestures and movements to talk about math. Glenberg (2010) also says that movement-based ideas in learning are impactful on how children build meaning from their academics. For elementary students who are more movement-based learners, having movement in lessons creates more opportunities for engagement and understanding. Mahar et al. (2006) say that classroom-based physical activity has an effect on students' ability to stay on task, with students who have movement breaks showing higher rates of attention compared to students who don't. Howie et al. (2015) also found that even small moments of physical activity in the classroom improved executive function in students' academics, saying that movement breaks are a tool for keeping elementary students focused throughout the school day.

Social–Emotional-Behavioral Benefits of In-Class Movement

Movement also has an important role in supporting the emotional and social-emotional development of elementary school students. Greenberg et al. (2017) talk about how social and emotional learning within the classroom, which includes movement-based components, leads to a lot of improvements in students' ability to handle their emotions, make friends, and engage in school. Schonert-Reichl (2017) says the role that mindfulness and body-based activities have in helping students develop self-awareness and understanding their emotions, skills that are very heavily worked on during elementary school. Jennings (2015) says that these practices help not just students but also teachers, creating classroom environments that are calmer and more supportive to everyone. Something that was mentioned was the idea that not all movement needs to be high-energy to be helpful. A lot of the research talks about the value of running around and getting rid of energy, but movement that calms students' bodies, such as yoga and stretching, also

has a lot of value for elementary students (Lazar et al., 2005). Being able to settle their body and minds before starting work in the classroom is just as important as running around and playing.

It is also important to talk about how not all elementary students have the same amount of movement opportunities in the school day. London (2019) talks about how recess equity is a big issue, mostly in under-resourced schools that cut recess time to have more time for academics, negatively impacting students from low-income communities. Foucault's (1977) readings on discipline and punishment are important, giving a chance for reflection on how schools have regulated children's bodies in ways that have a big impact on controlling learning and development. Bringing these perspectives into conversation with a positive amount of findings about movement shows the idea that the goal should not only be adding movement to the school day, but making sure that all elementary students, regardless of where they go to school, have access to the movement that the articles show they need (CDC, 2017). When movement is treated as an important part of elementary education rather than an add-on or reward, it has the chance to support students academically, socially, emotionally, and physically in ways that are both meaningful and impactful (Institute of Medicine, 2013; Donnelly et al., 2016).

Even with all of the research that points to how important movement is for students, the reality of what is happening in schools tells a very different story. Because of the pressure that schools face around standardized testing, recess time has been cut, and students are spending more and more of their day sitting at their desks getting ready for tests (Ramstetter, Murray, & Garner, 2010). The push to have students perform on tests has taken over a lot of the school day in a way that leaves very little room for the kind of movement that the research says students need. This is a really hard thing to sit with, because the studies are clear that movement helps students focus, do better academically, and manage their behavior, but the system that students

are in is pulling in the opposite direction. The more time that gets taken away from recess and movement to prepare for tests, the more we are working against the very thing we are trying to improve, which is how well students are learning and doing in school (Pellegrini & Bohn, 2005; Hillman et al., 2014).

Conclusion

Something else that the literature does not always talk about directly, but is really important to bring up, is that not every student has the same access to movement during the school day. There are a lot of class differences when it comes to recess, in-class movement, and the kinds of creative lessons that allow students to engage with their bodies and not just sit still. London (2019) talks about how recess equity is a real issue, especially in schools that do not have the same resources as others. Schools that serve lower-income communities are more likely to cut recess and movement time in favor of more test prep, which means the students who arguably need movement the most are the ones getting the least of it. At the same time, schools with more resources tend to have the ability to offer things like movement-based learning, yoga, and creative lessons that let students be active while they are learning. When movement becomes something that only certain students have access to, depending on where they go to school, it stops being an equal opportunity and starts being another way that the school system leaves some kids behind (Foucault, 1977; London, 2019).

This is exactly why this research project matters. While there is already a growing body of work that looks at how movement impacts focus and learning, there is still a lot more to understand, especially in schools that are under-resourced and do not have the same built-in opportunities for structured movement that other schools do. This study looks specifically at how

movement affects focus in a low-income school setting, where students may not be getting the movement they need during the day and where the impact of that gap is felt in real and meaningful ways in the classroom. The goal is not just to add to what we already know about movement, but to understand what it looks like when movement is missing and what we can do about it. If we can find ways to bring more movement into these classrooms, even in small ways, we have a chance to start closing the gap between what students need and what they are actually getting, and that is something worth looking into (London, 2019; Institute of Medicine, 2013).

Theoretical Framework

Throughout the literature that has been researched, there is a clear understanding that movement is important to students within elementary schools. Whether that be physical outdoor movement in recess or more controlled movement within the classroom, movement has been shown to have a positive impact on how students function within the classroom and their experience within schools. From that research, there were certain points where ideas of what movement impacts became clear and consistent throughout the articles. Whether the movement, both through outdoor recess or in-class moving activities, is shown to enhance cognitive function, academic focus, emotional and behavioral regulation, or greater patience and social control, the impact of movement connects to a concept called flow. Flow is a state of deep focus and has many positive classroom outcomes. The outcomes that were most prominent in my research were academic success, decreased negative behaviors, and smoother transitions within the classroom.

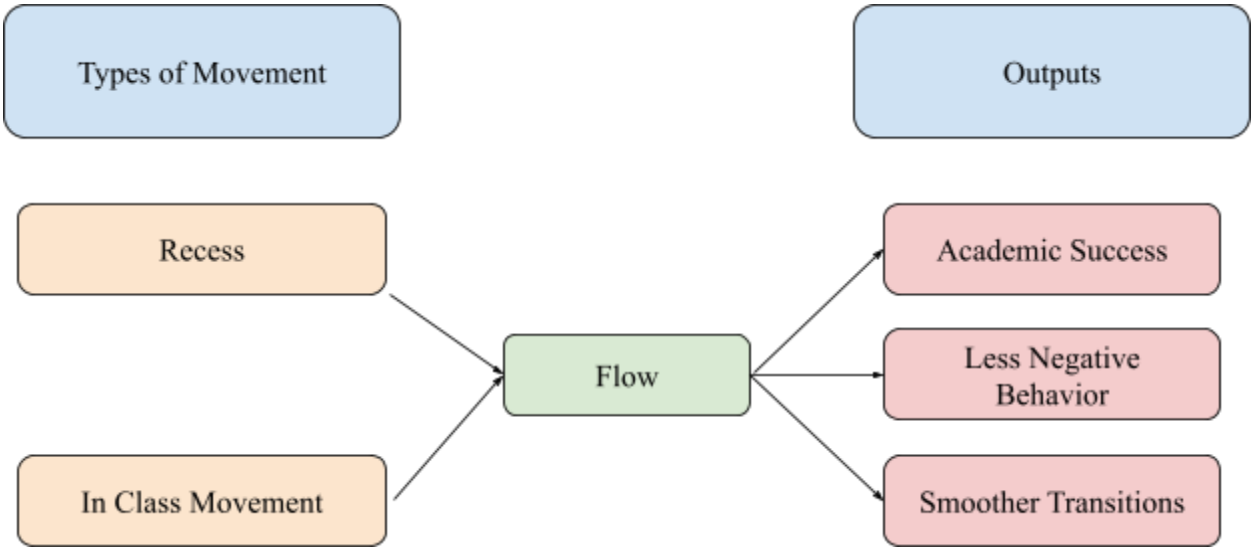

Figure 1

Within this model (see Figure 1), you can see what the types of movements are being considered (the left side in orange) within an elementary school, their connection to Flow, and the impact that Flow has on students after they have had opportunities to move (the right side in red). The connections between how students are after movement and the importance of flow are something that were very prominent within my understandings and beliefs related to movement in school.

What is Recess?

At Apple Academy, there were different kinds of recess that the students would partake in. Within my project, I was interested in comparing the difference between when they can leave the classroom and run around versus indoor recess. Those recesses were about 15-minute blocks within their school day that allowed for different kinds of movement based on what kind of

recess they had. Outdoor recess was when the students would be able to go outside and run around on the Blacktop with other students and do activities such as soccer, draw with chalk, and sit in the sun. Indoor recess consisted of the students staying in their classroom and doing activities such as playing with toys, drawing, and reading. Throughout each quarter, the rotation of their recess inside and outside would change, and the number of days inside versus outside would change.

What is In-Class Movement?

When talking about in-class movement, this is talking about the idea of having lessons or classroom activities that include aspects of movement. This can be used to either get students to do hands-on learning, keep them engaged with movement, or calm them down before they start a lesson. This can include Chair Yoga, Pair and Share, asking students to go for a walk down the hallway, and activities where you have to move around the classroom. In-Class movement is not to get students to exert physical energy, but a method to keep them interested in the activity and work with different types of learning styles involving their bodies.

What is Flow State?

Flow state has been studied extensively in education and shows up across many areas of life, including music, sports, education, and the workplace. Flow was first examined by Mihaly Csikszentmihalyi, who began studying it while researching the creative process (Nakamura & Csikszentmihalyi, 2002). He talks about how flow is a state where someone is fully focused and working at the best of their ability, and found that it can lead to higher performance, more creativity, and a greater sense of enjoyment in what someone is doing (Šimleša et al., 2018). One

of the things that makes flow so interesting is that it shows up in a lot of different activities, and people who experience it tend to describe it in very similar ways, no matter what they are doing (Csikszentmihalyi, 1994).

Csikszentmihalyi and others have found this by talking to people who had done really significant things in areas like literature, science, music, and other activities, but also in activities like sailing, factory work, and computer programming (Šimleša et al., 2018). They found that the way people described being in flow was the same across all different areas. The consistency throughout all areas showed how meaningful the flow state was to participating in activities and how it positively impacted people throughout multiple areas (Šimleša et al., 2018).

Flow also matters for how people feel overall in their lives. The more time someone spends in a flow state, the better their quality of life tends to be. People who experience flow regularly say they have higher levels of focus, creativity, and positive feelings (Nakamura & Csikszentmihalyi, 2002). Research has also shown that positive feelings that come from flow can actually change the way people think, helping them pay attention more broadly, be more creative, and make better decisions (Šimleša et al., 2018). This is why understanding flow is so important, because it is not just about feeling good in the moment, but about how it can change the way people engage with the world around them.

Characteristics of Flow State

Flow state has a specific set of characteristics that make it different from just feeling good or being in a good mood. Csikszentmihalyi (2008) identified ten main features that describe what it actually feels like and what needs to be in place for flow to happen. Those ten features are: (1) a balance between how hard something is and how skilled the person is, (2) clear and small goals

to work toward, (3) getting feedback right away on how things are going, (4) being motivated by the activity itself rather than a reward, (5) being extremely focused, (6) temporarily not thinking about yourself or how you appear to others, (7) feeling like time is moving differently, (8) feeling like you are in control, (9) feeling like your actions and your awareness are the same thing, and (10) being deeply involved with your attention (Šimleša et al., 2018).

The first, and can be seen as the most important characteristic, is the balance between how hard something is and how skilled the person is within that area. For someone to get into flow, the task they are doing needs to match their ability to do the subject. If the task is way too hard, the person is going to feel anxious and overwhelmed and will have a harder time attempting the task. If it is way too easy, they are going to feel bored and not feel as though they have to complete the task (Šimleša et al., 2018). It is only when the task matches their skill level, when it is challenging enough to require full attention but not so hard that it feels impossible, that flow becomes achievable. This is often called the challenge-skill balance, and it is the starting point for everything else that happens within flow.

The second and third characteristics, clear goals and immediate feedback, are also connected to each other in that the Flow Engine Framework groups them as one characteristic (Šimleša et al., 2018). When someone is in flow, they need to know what they are working toward in the short term, and they need to be getting some kind of signal about how they are doing; otherwise, it will be harder to maintain a flow state. These do not have to be big goals or formal feedback, but they can be small, in-the-moment signals. These small goals and constant feedback keep the person doing the task moving forward and let them adjust what they are doing without getting out of flow.

The fourth characteristic is intrinsic motivation, which talks about the person doing the activity because they actually want to do it, not because they are going to get something out of it at the end (Deci & Ryan, 1985, as cited in Šimleša et al., 2018). Flow is really tied to this kind of motivation because when you are doing something for the love of doing it, you can give it your full attention. When you are doing something for an external reward, part of your brain is always checking in on whether you are meeting that external goal, which pulls focus away from the activity itself. This is why flow and intrinsic motivation are so connected.

The rest of the characteristics are mostly about what it actually feels like when you are in flow. Hyper focus means that the person is so locked in on what they are doing that everything else kind of fades out. Loss of self-awareness means that while you are in flow, you stop thinking about yourself, what you look like, what other people think of you, or anything outside of the task. Time distortion is the most common one, where people in flow look up and realize way more time has passed than they thought. The feeling of control and the merging of action and awareness are both about how natural and effortless the whole experience feels (Šimleša et al., 2018). Together, all of these characteristics paint a picture of what it looks and feels like when someone is operating at their best.

The Flow Engine Framework, put together by Šimleša et al. (2018), organizes all of these characteristics into a model that shows how they work together. The inputs are the things that need to be in place before flow can happen, like the challenge-skill balance, clear goals, and feedback. The core processes are attention and motivation, which are the things that actually drive the flow experience. The outputs are what comes out of the flow, including absorption, positive feelings, and results on the task (Šimleša et al., 2018). This model is useful for thinking

about education because it helps identify specific things that teachers can put in place to make it more likely that students will get into a flow state during learning.

How Movement Creates Flow

One of the most direct connections in the flow state literature is the link between movement and the conditions that flow needs to happen. The Flow Engine Framework makes it really clear that before a student can get into a flow state, certain inputs need to be in place, and one of the most important of those is that the student needs to be in a regulated mental and physical state where their attention can actually settle onto a task (Šimleša et al., 2018). Movement is one of the most straightforward ways to help students get to that place. When students have a chance to move their bodies, whether that is through something like outdoor recess, a walk, or a movement activity built into a lesson, it gives their nervous systems a chance to reset in a way that makes focus more possible afterward. This is not just something that teachers notice intuitively. The research on physical activity and learning backs it up, showing that movement has a real impact on the brain functions that support attention, memory, and engagement (Hillman et al., 2014).

There is also a lot to say about how movement connects to the motivational side of flow. The Flow Engine Framework describes intrinsic motivation as one of the core processes that drives the flow experience, meaning that for flow to happen, the student needs to actually want to be engaged with what they are doing (Šimleša et al., 2018). Movement can help with this, too, because when learning involves the body, it tends to feel more interesting and engaging than when it is purely about sitting still and absorbing information. Action-based learning, which is built around using physical activity as part of how students interact with the material, has

become more common in classrooms for exactly this reason. It gives students a different way into the content that can feel more natural and enjoyable, which makes it more likely that they will bring their full attention to what is being asked of them (Blakemore, 2003). When both the physical and motivational conditions are in place, students are a lot closer to the state that the flow framework describes as optimal for learning.

What this means for the classroom is that movement is not just a nice extra. It is actually one of the tools that teachers have for creating the conditions that make flow possible in the first place. The Flow Engine Framework is useful here because it helps explain why movement works the way it does. It is not just that students are happier after running around, it is that moving their bodies helps create the internal state, the regulated attention, the readiness to engage, that the flow inputs require (Šimleša et al., 2018). At the same time, the research is detailed that not all movement does this equally, and how movement is structured matters a lot for whether it is going to support the conditions for flow or disrupt them. Movement that is calm and purposeful, like a short walk or a stretching routine, tends to help students settle. Movement that is exciting and unstructured without a clear ending point can actually leave students more activated and harder to bring back to focus. Understanding this connection is important for thinking about how movement can and should be used in classrooms, especially for students who have fewer movement opportunities built into their day (Blakemore, 2003; Šimleša et al., 2018)

Flow State and Academic Success

Within the literature about flow state, one of the things that comes up most often and most consistently is the connection between flow and how well students do academically. There is a lot to say about how being in flow impacts students in terms of how engaged they are with

their learning, how long they stick with hard tasks, and what they are actually able to produce and achieve. When students are in a flow state, they are working at the top of their ability, and that tends to show up in the academic work they produce.

Research has found a positive relationship between flow and performance, especially in school settings (Engeser et al., 2005; Schüler, 2007, as cited in Šimleša et al., 2018). Engeser and Rheinberg (2008) found that flow actually predicted how well students did in school in two out of three of their studies, including one where students were learning statistics and another where they were learning French. There are a couple of reasons why this makes sense. One is that flow is just a state of really high functioning, so it naturally supports doing well. The other is that when students experience flow, it makes them want to do more. They feel more motivated to keep going and to take on harder challenges in order to get that feeling back (Bakker et al., 2011, as cited in Šimleša et al., 2018). That kind of cycle can really build momentum for students in their academics.

Flow also has a strong connection to creativity, which is an important part of academic success that goes beyond just grades. Studies of musical group composition found that higher levels of flow were connected to higher levels of creativity in students (MacDonald et al., 2006, as cited in Šimleša et al., 2018). Similar things were found in the workplace, where flow was a strong predictor of how creative workers were (Zubair & Kamal, 2015, as cited in Šimleša et al., 2018). When students are in flow during academic tasks, they are not just doing more work; they are doing better and more creative work, which says a lot about the quality of learning that is actually happening.

Research using the Experience Sampling Method found that students report feeling their best when the challenge of what they are doing matches their skill level. When that is happening,

they describe feeling more active, more alert, more focused, and more satisfied with what they are doing (Carli, 1986; Massimini et al., 1987; Nakamura, 1988; Wells, 1988, as cited in Šimleša et al., 2018). All of those things directly connect to doing better in school. A student who feels alert, focused, and satisfied with their work is going to engage more deeply with hard material and put more effort into what they produce. Creating the conditions for flow in a classroom is really about setting up the best possible environment for students to do their best academic work.

Intrinsic motivation also plays a big role in how flow connects to academic success. The link between challenge and enjoyment is stronger when students are doing something because they genuinely want to do it, compared to when they are doing it for an external reason (Abuhamdeh & Csikszentmihalyi, 2012b, as cited in Šimleša et al., 2018). This matters for teachers because it means that when lessons tap into what students are actually interested in and curious about, it creates better conditions for flow and therefore for deeper learning. Movement can be one way to do this. When students get to engage with material through their bodies, through hands-on activities or action-based learning, it makes the activity more interesting and enjoyable in itself, which makes flow more likely to happen (Guay, 2022).

Flow State and Negative Behavior

Another area where flow state connects in a really meaningful way to what happens in classrooms is with negative and disruptive behavior. Within the literature, there is a lot of positive information about how flow state helps students, and one of the more interesting things is how being in flow seems to reduce the chances of disruptive or off-task behavior coming up. When a student is fully absorbed in something that feels meaningful and appropriately challenging, there is just a lot less room for negative behavior to show up.

The reason for this has to do with where attention goes during flow. When a student is in flow, most of their attention is going toward the task, which means there is less attention left over for things that lead to disruption (Abuhamdeh & Csikszentmihalyi, 2012a, as cited in Šimleša et al., 2018). Flow is also a state where students stop thinking about themselves and how they appear to others (Šimleša et al., 2018). A lot of disruptive behavior in classrooms comes from students being self-conscious or wanting to look a certain way in front of their peers. When a student is in flow, that self-consciousness goes away, which takes away some of the social pressure that can lead to acting out.

Csikszentmihalyi used the term psychic entropy to describe the opposite of flow, which is basically when a student's mind is disorganized and unfocused (Šimleša et al., 2018). This is what tends to happen when students are either bored or anxious, and those are exactly the conditions where negative behavior is most likely to show up. A student who is bored because the work is too easy has nothing real to put their attention toward, so it goes somewhere it should not. A student who is anxious because the work is too hard may act out as a way to avoid or escape that feeling of being overwhelmed. The Flow Engine Framework helps show why boredom and anxiety are the two main entry points into behavioral problems in classroom settings (Šimleša et al., 2018).

This has a direct connection to how teachers design and structure activities. When teachers think carefully about matching the challenge level of tasks to what students are actually able to do, they are not just supporting learning; they are also reducing the conditions that lead to negative behavior (Šimleša et al., 2018). Students who are working in that sweet spot where the work is hard enough to be engaging but not so hard that it feels impossible are less likely to be bored or anxious, which means less likely to act out. Movement can help with this, too.

Action-based learning activities can bring more students into that challenge-skill balance by giving them a different way to engage with the material, which can reduce the number of students who end up in boredom or anxiety territory (Blakemore, 2003).

There is also something worth noting about the emotional side of flow and how it connects to behavior. When students are in flow, they tend to feel a lot of positive emotions like satisfaction, joy, and a sense of being alive and engaged (Šimleša et al., 2018). Those positive emotions have been shown to actually change the way people behave, making them more open, more collaborative, and less reactive (Fredrickson & Branigan, 2005, as cited in Šimleša et al., 2018). A student who just came out of a really absorbing, positive flow experience is going to be in a different emotional place than a student who just sat through something that felt boring or pointless. Over time, when classrooms regularly create conditions for flow, it can shift the overall feel of the class toward something more positive and collaborative, which naturally reduces negative behavior.

Flow State and Smoother Transitions

Transitions are something that comes up a lot when talking about classroom management, and they are one of the more challenging parts of the school day. Transitions are those moments where students move from one activity to another, shift to a different space, or have to change what they are focused on. These moments are really common times for disruptive behavior to happen, and flow state theory actually helps explain why that is and what can be done about it.

From a flow state perspective, transitions are hard because they cut off the conditions that allow for real engagement. The Flow Engine Framework describes flow as something that is always moving and adjusting, driven by a constant back-and-forth between skill level, challenge,

goals, and feedback (Šimleša et al., 2018). When a transition happens, all of that gets disrupted at once. A student who was locked in on a task, with a clear sense of what they were working toward and how they were doing, is suddenly being asked to stop everything and start something completely different. That is a big ask, and it makes sense that students struggle with it.

The time distortion characteristic of flow is especially relevant here. When students are in flow, time tends to feel like it is moving faster than it actually is (Nakamura & Csikszentmihalyi, 2002, as cited in Šimleša et al., 2018). This means that a student who is fully absorbed in something may genuinely not realize how much time has gone by, and when the teacher signals a transition, it can feel really abrupt and jarring to them. Understanding this can change how teachers respond when students have a hard time transitioning. Rather than seeing it as defiance or not listening, a flow-informed perspective recognizes that the student is coming out of a state of genuine absorption, which takes a moment to shift out of.

Movement can be really helpful for making transitions smoother. A lot of the literature talks about movement as a way to get energy out, but movement can also be used to calm students down and get them ready for what is coming next (Blakemore, 2003). A short movement break between activities, like a stretch, a breathing exercise, or even just a brief physical reset, can help students shift their bodies and minds from one mode to another. These kinds of routines can act as a bridge between the activity the student is leaving and the one they are about to start, making the jump between them feel less abrupt and giving students a chance to settle before they need to focus again.

The Flow Engine Framework also talks about executive attention, which is basically the brain's ability to shift focus and adjust when something changes (Šimleša et al., 2018). Transitions require a lot of this. Students have to stop what they are doing, reorganize, and

redirect their attention toward something new, all while managing whatever feelings come with leaving an activity they were invested in. For students who find executive functioning harder, this is an especially big challenge. When teachers build predictable, consistent transition routines, it takes some of that load off. Once students know the routine, the steps of the transition become more automatic, which frees up mental energy for the actual shift in focus that needs to happen.

The role of clear goals and immediate feedback in flow also applies to transitions. When students know exactly what is expected of them during a transition, what they should be doing, how long it takes, and what comes next, it helps them re-engage more quickly once the transition is over. Teachers who build structured routines that give students that kind of clarity are setting up conditions where students can get back into a focused, engaged state more easily after the disruption of a transition (Šimleša et al., 2018; Guay, 2022). Over time, these kinds of routines can make a real difference in how smoothly the school day runs and how much learning time is actually protected.

Methods

Methodology

My goal in this research project is to explore the ways student movement, both via outdoor recess and through in-class activities, impacts students. I wanted to explore whether other students have similar experiences when afforded greater opportunities to move. By conducting this research, I hope to examine the impact of movement on students and teachers and how it shapes their academic engagement and performance.

Most of my project involved an ethnographic examination of the impact of bodily movement in a third-grade classroom (Bloome, 2013; Burowoy, 1991; Robinson, 2013). While I focused on the extended case of one third-grade classroom (Burowoy, 1991), I supplemented this with interviewing three teachers. At the end, I ran out of time to teach a lesson plan involving movement in the classroom. But I ended up designing a unit of lesson plans for a math class on three-digit subtraction that I look forward to implementing as a teacher in the next year.

In engaging in the participant observation of classroom field work, I was inspired by Ballenger's work on using kids' opinions and thoughts within the classroom to create a more sustainable learning environment (Ballenger, C. 2009). Within her piece, she talks about how teachers can use students' misunderstandings and unexpected questions as opportunities for deeper learning and inquiry (Ballenger, C. 2009). This proved useful in my own project because the whole premise is to learn about how children react to movement-based learning. Hearing from students allowed me to gain a deeper understanding of their learning experience at Apple Academy. Ballenger also talks about drawing from classroom experiences in urban settings; she emphasizes the importance of listening closely to students' ideas even when they seem incorrect. This one is very important within my research because we are in an urban setting, being in Worcester, and because there are different limitations to other schools, and by understanding where kids may be confused or unsure of their learning, we can advance classrooms and allow for their misunderstandings to guide new projects and new experiences for the kids to then understand and feel confident in their learning.

Balleinger also talks about how, by taking what students say in the classroom and their experiences with the activities, teachers can engage in teacher research by reflecting on moments in the classroom, whether it be where a child understands the lesson or parts where they may be

confused, and use those moments to then guide instructions and further opportunities for students (Ballenger, C. 2009). This also allows teachers to converse with one another and other faculty within schools to have open discussions on what is working and what is not working, and from the experience of the students, they can decide how they can go forward and improve their school systems (Ballenger, C. 2009). I believe this is so important for my project because the end goal is for the students to do better with movement, and also see if movement should be implemented in more schools. By having conversations with faculty about what they're seeing in the classroom and how they would improve, I will be able to gain a better understanding of the students' experiences and how they are being accommodated.

Lastly, another approach that Ballenger took is that if educators go by this approach and consult the ideas of their students ' behavior, they focus more on the responsive and meaningful learning environment that values the students' voices and thinking processes (Ballenger, C. 2009). This is important because when being an educator, your number one goal is to be able to teach students in a way that they will understand and gain more knowledge through what you are teaching them, but you also want them to be impacted positively. By taking this approach with learning, you are directly taking what your students have voiced, whether it be concerns, what they enjoyed about it, their questions and comments, or their observations. Implementing that into other parts of the classroom to deepen the impact of the work and allow them to enjoy it makes their conclusions and opinions based on the information that you have given them. This is important within my research because my goal is to understand the impact that movement-based learning has on students, and if I can see first-hand classrooms that allow for students'

observations to be heard and then used, then I will be able to get the most honest answer from the students about their experience with the movement-based learning.

Epistemological Stance

I believe that through field notes and observations, looking through artifacts and interviews, I will be able to get a full understanding of what movement means to elementary school teachers and the community as a whole. Being able to be a part of a community and understand there is a structure within the class, and also the way students and teachers interact with it, allows them to tell their stories about themselves, who they are as people. Through the stories being told, I will be able to get a better understanding of movement and how it impacts them throughout their academic lives.

When it comes to field notes and observations, I will be able to step into their world and see a little bit of what their routines are and understand how students interact with one another, how the teacher interacts with the students, and through that, I will be able to fully take in and understand what the classroom norms are and also how students interact with those norms. It is crucial to start with observation and field notes because I want to be able to not interfere as soon as I get to my site, and just allow them to be comfortable with me being in the room and allow them to be comfortable with me and their space. I want to make sure I'm not intruding on anyone, especially the students or the teachers, and I want them to feel as though they can go about their day-to-day lives while I'm there.

By looking at artifacts and documents through this, I'll be able to see a physical copy of how their curricula are set up, what their lesson plans include, and get an understanding of what

is allowed and what is referred to in a lesson plan. When I create my final product, I don't want it to be something that is far out of reach, where I'm creating something just for my sake, but I want this project to be beneficial to the students and teachers at Apple Academy. I believe, with Patricia Hill Collins (2022), that knowledge is held best by those closest to the experience. Therefore, teachers must have a voice, especially in this project, because they are seeing firsthand what the movement does to students, and having their input would be extremely valuable within my research. Therefore, it is important to interview the teachers to get first-hand experience and knowledge on what movement does to a classroom, and also what their opinions are on movement, and if this project has meaning in the challenge I am trying to bring attention to. I hope to create a space where teachers can have free conversations about their classrooms and be able to share their positive and negative reactions, if they have any, to the movement at Apple Academy.

Site Description

Apple Academy is an elementary school located in Worcester, MA. It is directly attached to a high school named Orange Academy, which shares a lot of the same spaces, such as the lunch room, gymnasium, and auditorium. Within Apple Academy, there is a large number of students who are English second language students, African-American students, and also students who come from a lot of different backgrounds. At Apple Academy, specifically, they do not have a playground. They do not have the funds or the space to have a playground, so their outdoor space is a small square of pavement that is fenced in so that students are safe.

Because of the number of students that are in the school and the small lot for play, the school cannot have all of its students outside every day for recess, so they have a schedule that

offers a rotation of different outdoor times. This means that each class only has one to two days outside each week. But the schedule rotates, so classrooms switch from only having one or two outdoor recesses each week. When they do not have outdoor recess, they have recess indoors, which is an opportunity for them to play games, draw, sit with friends in their classroom, but they are not allowed to run around, and they are not allowed to throw any balls or play with outdoor materials.

Positionality

My position within this project places me as an outsider. I entered the school not knowing any of the students or teachers. Before I began my project, I had no connection to this school. I really wanted to make sure that this project was going to be able to benefit the school. I wanted to make sure that I was working with the teachers and supporting them, not having them feel like I am trying to fix their classrooms. I wanted to make sure that I set a comfortable environment where there's open communication. It was important to me to make sure that everyone was comfortable during my project, so I'm able to keep the connections I made with the school.

As a multiracial woman, I found myself to be very comfortable with the students, seeing as most of them are students of color. I haven't really been in a classroom where there aren't majority white students, so being in a classroom with students of all skin colors makes me more comfortable to bond with the students and make connections that can help me throughout this project. I'm also a student who has ADHD and dyslexia, and within the schools, there tend to be quite a few students who, from speaking to the teacher, don't have access to the resources they

need for attention deficit disorders or social-emotional needs. So I developed a strong connection to these students, trying to help them in an area that I know a lot about. As I never really had those connections and resources until I was older, creating a space where they felt heard and seen and had access to needed resources was something very important to me.

Because I am an outsider, I know that I will need to pay attention to the power dynamics. Allowing me to enter their classrooms and talk about their classroom dynamics places teachers in a vulnerable position. To address these dynamics, I began visiting the school and talking with the teachers I worked with a couple of times each week to begin to build connections and trust. I also communicated with them that I was excited to learn from them as someone who looks forward to following their path to become a teacher. I recognized that I was in a situation where if I overstepped, I could really offend the teachers and staff, and that was absolutely not what I wanted to do. So being able to really work together and make sure that we are in total agreement on what is going on was very important within my project. I worked to communicate with them during each stage of the project and remained open to listening and learning from their feedback.

Participants

The participants within my project were the teachers within the Apple Academy, and also the students of a third-grade class, with whom I worked directly for my project. I involved the teacher so that we had a good connection, and we worked together on this project to make sure it was something beneficial for her class, while also helping to really comprehend my study and allowing me to get good data on my project. I involved the students because they are the main

reason I want to be doing this project; I want to see what the impact will be on students. So I need to observe and pay attention to them.

Some important demographic details about these participants. There were 17 students in total in the class, which included 14 students, 4 who were African-American, 7 Hispanic students, 2 Asian, and 4 White. All the students live in Worcester. I believe it's important to know these things about the students, just to know their backgrounds, what they have been exposed to, and overall their position within this project and within the school system.

Data Collection

Interviews and Audio Recordings:

The study started with interviews with teachers at Apple Academy. I started with this, so I could have a conversation about the classes at the school and how movement could or should be included. We also discussed why movement is important in their curriculum. I interviewed 3 teachers to get a better understanding of how the school operates and their views about movement.

The semi-structured nature of the interviews meant that I asked follow-up questions like: Can you say more? Can you give me an example of that? Is there anything you would like to add before moving on to the next question? Etc.

Taking Field Notes

When observing and taking field notes, I observed 1 classroom in the 3rd grade throughout my senior year. This class had 20 students and 3 adults (teachers and aides) that I observed.

Data Analysis

In the process of looking through my data, I coded the interviews so that I could take into consideration the views of the teachers and how that then reflects or rejects my understanding of movement. Because of my position, I wanted to be able to take their opinions and see what the correlations were and how they were able to impact my research. What I coded for was how students responded to movement, whether it be negative or positive, and how it helps them or doesn't help them throughout the school day.

When looking for positive and negative reactions, I was pulling for examples where teachers were talking about whether movement aided or disrupted their classes. Positive reactions would have consisted of having students be well exercised after the activity, focusing throughout the lesson, collaborating with their peers, and understanding the content of what they are being taught. Examples of students reacting negatively towards movement in the classroom would be the students losing control of their bodies during the lesson, not respecting boundaries of other students, and the movement that was implemented taking away from the lesson rather than adding to it. Initially, I paid attention to student behavior and engagement and sought to notice differences between days when they had access to outdoor recess and days when they did not. I also wanted to learn more about the opinions of teachers and how they feel about movement—whether they implement it in their classes or not. I looked to see if there's a positive

reaction to movement for students and for teachers that helps students to focus more on their academics. I also was interested in their plans for movement in their lessons and what strategies they currently use to engage students in their classroom.

Findings

What did I do?

Some of the actions that I took were to clearly understand what was happening within the classroom and to get a better sense of what the challenges were. For most of this academic year, I volunteered at Apple Academy to clearly understand what was happening within the classroom and to get a better sense of what the challenges were. Within those observations, I took field notes that described what was happening in the classrooms, how students were interacting with one another, and also when there was movement, seeing how the students interacted with it. I was also paying attention to the different impacts of the days when students had outdoor recess and when they had indoor recess.

After I had taken time to complete a lot of observations to develop a baseline, I then interviewed three teachers within the elementary school. I was able to ask them about their understanding of movement and whether that lack of access to outdoor recess was a concern related to their students' academic performance. Once I had gathered all of the data from my observational field notes and interviews, I analyzed the findings and developed my intervention in collaboration with my partnering teacher.

Finally, I had intended to teach a few lesson plans featuring movement, but I ran out of time. So instead, I created a set of 8 lesson plans surrounding one unit (3-digit subtraction),

which incorporated movement. I incorporated the ideas that the teacher interviews provided. I plan to implement these lessons with movement when I begin student teaching next year.

Impact of Outdoor Recess

One of the most consistent things I noticed during my observations was what happened after students came back from outdoor recess. The data I collected showed this pattern in three main areas: academic performance, negative behavior, and how smoothly students were able to transition back into learning.

Academic Performances

One time when I was observing the classroom and the students had come back from outdoor recess, we were starting reading and writing, and had three separate tables for three separate activities connecting to the same lesson. Once they had gotten to their seats and started their activities, they were the quietest I had ever seen them. They were listening to the teachers in the room, each other, and when they were asked to quietly complete questions on their work, they were quick to do so. That specific day, I had seen that the morning was a bit chaotic, with the students having a hard time paying attention, and work not getting done within the class period. Then, as we were doing our stations, she turned to me and said: “Is this not a completely different class than this morning?” (Field Notes, October).

What this moment showed me was a really clear example of what the flow framework calls the inputs being in place. In the morning, before recess, the students were not in a state where flow could happen. They were distracted, off task, and not ready to engage with the work. But after recess, something had shifted. They were calm, they were focused, and they were ready

to take on the task in front of them. The teacher's comment about it being a completely different class speaks to exactly what the flow research says, which is that when the right conditions are in place, students can work at a level that is noticeably different from when those conditions are missing (Šimleša et al., 2018). Movement was the thing that helped create those conditions.

The Flow Engine Framework helps explain why this made such a difference. According to Šimleša et al. (2018), flow state requires certain conditions to be in place before it can happen, and one of the most important is the balance between a student's skills and the challenge in front of them. When students are stuck inside without a chance to move, that balance gets harder to reach because their bodies are restless and their attention is already pulled in different directions. Outdoor recess gave students a chance to reset. Once they came back in, they were more ready to focus, which made it easier for them to actually engage with their work at a level that matched what was being asked of them.

One of the things that the flow state framework helps explain is why coming back from recess seemed to flip a switch for students when it came to their academic performance. The theoretical framework talks about how flow requires the right conditions to happen, and one of those conditions is that students need to be in a mental and physical state where they can actually give their full attention to what they are doing (Šimleša et al., 2018). Movement, like outdoor recess, helps students get to that place. When their bodies have had a chance to move and release energy, they are more able to settle into a task and stay focused on it, which is exactly what the Flow Engine Framework describes as the starting point for getting into flow.

Indoor recess told a different story. While outdoor recess seemed to help students reset and get ready to engage, indoor recess did not always have the same effect, and in some cases, it made things harder. The Flow Engine Framework points out that for flow to happen, students

need more than just a break. They need clear goals, feedback on what they are doing, and a task that matches where they are at skill-wise (Šimleša et al., 2018). When students had indoor recess, they were often coming back into the classroom in a more activated state, without having had the kind of physical release that helps the body and mind settle. This made it harder to reach the kind of focus and absorption that supports real engagement with their work. What I observed in the classroom, and what the teachers I interviewed shared with me, pointed to this being a real challenge across academic performance, student behavior, and transitions.

Less Negative Behavior

When the students were able to go outside and run around, there were clear signs that, once they came back in, they were in better moods, which allowed them to enjoy time in the classroom more than when they were stuck there for indoor recess. One student in particular needs a lot of movement to focus, and when she was able to go outside and run around before coming into the classroom, she was less disruptive. Instead of talking back to teachers, she was able to ask for help and collaborate with others effectively. A lot of the time, when I would try to help her with her work, she treated me like a "friend" rather than an authority figure, but once she was able to have some fun outside and get energy out, she was a lot more receptive to feedback and collaboration.

The flow state framework has a lot to say about why movement before learning can reduce negative behavior in students. One of the things the theoretical framework talks about is what Csikszentmihalyi called psychic entropy, which is basically the disorganized, unfocused mental state that students are in when they are frustrated, bored, or overwhelmed (Šimleša et al., 2018). When students are in that state, negative behavior is a lot more likely to come out.

Movement gives students a way to reset before coming back into the classroom, which helps bring them out of that disorganized state and into one where they can actually engage with what is happening around them.

One time, I saw this while I was observing for a couple of hours before and after outdoor recess. I had been helping this student with her work, and she was not very responsive to the work we were doing or the assistance that I was giving her. She then made a crude comment about my appearance (specifically about my tattoos and piercings), and though I did not take it to heart, once she had time to go outside and let out some of the pent-up energy from the day, she came up to me and apologized without any prompting. She shared that she said it had been because of her frustration with her work. We then went back to the classroom to work on a different subject, and while helping her with her work, she was a lot more receptive and kind towards me and was open to my guidance (Observational Field Notes, October).

This student's behavior before and after recess is a really good example of what the flow framework describes when it talks about the link between emotional state and behavior in the classroom. Before recess, she was frustrated, and that frustration was coming out in the way she was treating the people around her. After recess, she had been able to reset, and she was in a completely different place emotionally. The theoretical framework explains that positive emotions that come from movement and physical release can actually change how students behave, making them more open, more willing to work with others, and less reactive (Šimleša et al., 2018). What I saw with this student was that exact shift happening in real time.

The flow state framework talks a lot about how the conditions leading into a learning activity matter just as much as the activity itself. One of those conditions is that students need to be in a regulated, focused state before they can really engage with their work (Šimleša et al.,

2018). Indoor recess, and specifically the way it is structured at this school, seems to work against that. Rather than giving students a chance to come down from a high-energy state before returning to the classroom, the timing is set up in a way that brings them back inside right when their energy is at its peak, which is the opposite of what flow research says students need.

When speaking to a teacher, Sarah, she made the case that her students needed even more outdoor recess time, stating:

> We at our school split it up 15 and 15, which is, like, not great because research shows that 15 minutes is your peak high of energy. We're taking them out at their peak high and then bringing them inside, trying to get back and regulate and do some learning. And then later in the day, we take them back out. And then again, we take the map, like we leave 15 minutes, they're at their peak eye of energy, and they don't kind of come down. (Sarah, 02/27/26)

What Sarah is pointing out is something the flow framework would describe as a mismatch between what the activity requires and what the student is actually ready for. Flow needs students to be able to settle their attention onto something, but if students are brought back inside right at their highest energy point, they are not in a state where that kind of focus is possible (Šimleša et al., 2018). This ends up creating more negative behavior, not less, because students are being asked to regulate and focus before their bodies have had a chance to come down from the physical high of being outside. The structure of the recess schedule itself is working against the conditions that flow needs to happen.

Smoother Transitions

Transitions are something the flow state framework spends a lot of time talking about, and for good reason. One of the things that makes flow hard to maintain is that it gets disrupted really easily, and transitions are one of the biggest disruptors. In my theoretical framework, I explained that when a student is in a state of flow, they are deeply absorbed in what they are doing, and pulling them out of that abruptly can feel really jarring (Šimleša et al., 2018). Outdoor recess creates a kind of natural, physical transition that actually helps students move between modes more smoothly, because the act of going outside and coming back in gives them a clear signal that one thing is ending and another is beginning.

When talking with one of the teachers, Mary, talked a lot about how her students really benefit from the separation of having recess outside and how that separation helped the students to distinguish work from play. She stated, “When we're outside, there's more of that physical, like, we've gone up the stairs, we're back in the classroom, now, like recess is over. There's like that hard line between it” (Mary,02/23/26). What Mary is describing connects really closely to what the flow framework talks about when it comes to the role of clear signals and structure in helping students shift their focus. The physical act of going outside and coming back up the stairs gives students a concrete, bodily experience of the transition happening, which makes it easier for their brains to follow. The flow research talks about how students need clear cues about where they are in the structure of their day in order to move smoothly from one state of engagement to the next (Šimleša et al., 2018). The stairs and the physical return to the classroom are doing exactly that, giving students a built-in cue that helps them shift gears without it feeling as disruptive.

When thinking about transitions through the lens of flow state theory, one of the things that stands out is how much the quality of what came before the transition matters for how the transition goes. The theoretical framework explains that when students are in a good state coming out of an activity, meaning they feel settled and regulated, they are able to shift focus much more easily than when they are still wound up or dysregulated (Šimleša et al., 2018). Indoor recess, because of the way it is structured, tends to leave students in a more activated state, which makes the transition back into learning a lot harder than it needs to be.

While interviewing a teacher, Mary, she spoke about the big difference in her students when they have indoor recess and how that impacts the teaching she has to do afterwards:

> Big difference. I noticed after indoor recess, it's really hard to get them back for those like 1st 15 minutes. Like, they take forever to clean up, and then they're fighting about this, and then they get to the rug, and half of them are ready, half of them are not ready. So I definitely noticed on the days that we have indoor research, there's a lot of lost learning time because we just have to kind of stop and get ready. (Mary, 02/23/26)

This is a really clear picture of what happens when the transition conditions are not right. The flow framework talks about how transitions work best when students have a clear signal that something is ending and something new is beginning, and when they are in an emotional and physical state that allows them to make that shift (Šimleša et al., 2018). After indoor recess, neither of those things seems to be happening. Students are still activated, there is no clear settling routine, and as a result, the first chunk of learning time after recess is basically lost. This is a direct example of what the research predicts will happen when the conditions for flow are not in place going into a transition.

In-Class Movement

Beyond recess, I also looked at what happened when movement was built directly into the classroom itself. This connects to the Flow Engine Framework in an interesting way because Šimleša et al. (2018) describe intrinsic motivation as one of the core processes that helps push students into a flow state. When students are doing something they genuinely want to do, something that feels engaging and not just like a requirement, they are more likely to put their full attention into it. Movement activities within the classroom have the potential to tap into that kind of motivation, especially for students who have a hard time staying engaged through more traditional, seated work. At the same time, not all in-class movement had the same effect. What I saw during my observations, and what teachers described in their interviews, showed that in-class movement could be both a tool for deeper engagement and, in some situations, a source of disruption. The data I collected around academic performance, student behavior, and transitions helped me understand when and why that difference showed up.

Academic Performances

The flow framework talks about how movement during learning can actually help students hold onto information better, because the body and the brain are working together in a way that makes the learning stick (Šimleša et al., 2018). This connects to the idea that flow is not just about sitting still and focusing, but about being engaged in a way that involves the whole person. When movement is built into a lesson, it gives students another way to connect with the material, which can make it easier to understand and remember. The teacher's evidence below speaks to exactly that idea.

When speaking with Mary, she mentioned how she believed that movement could help students more academically, rather than just physical exertion, but specifically about movement in the classroom. She stated, “It also helps with, like, the, um, like, brain connection. Like, it helps keep things, like, more, like, ingrained in your brain when you're doing, like, the movements to words and, uh, just, like, humors and stuff like that.” (Mary, 02/23/26)

What Mary is describing is something that the flow research supports, which is that when students use their bodies as part of learning, it creates a stronger connection to the material. The flow framework explains this through the idea that engagement is not just a mental th,,,,,ing, it is also a physical one, and when both are happening at the same time, students are more able to get into and stay in a focused, absorbed state (Šimleša et al., 2018). Tying movement to words and concepts is not just a fun activity; it is actually creating the kind of full-body engagement that makes learning more meaningful and more lasting for students.

Taking a Walk. While observing the classroom, there was a specific time when one student in particular, David, was having a very hard time sitting still while we were trying to complete a worksheet. He sits at his own desk when he does work sometimes, and this particular time, I was asked by the teacher to help with his work and keep him on task. When I was trying to prompt him to answer some of the questions, he was physically shaking in his seat. He was hitting his pencil on his desk, and he was not responding to any prompts or questions I was asking. As the teacher started to notice his lack of attention and his challenge with sitting in his seat. She said, “David, let's go on a quick walk”. He at first said he did not want to, but after some convincing, she left with him to do a short walk through the halls. Once they came back into the classroom, roughly 5 minutes later, he sat back at his seat and when I would repeat come of the same questions, he was so much more responsive and would immediately answer the

questions on the worksheet, listen to when I was trying to explain what was being asked of him, and also contribute his own thoughts and opinions on the materials we were working on. It was like a switch had flipped, and David had completely settled down and had time to reset before something went back into the classroom (Observations, March)

What happened with David is one of the clearest examples I saw all year of what the flow framework describes when it talks about the inputs of flow needing to be in place before learning can actually happen. Before the walk, none of those inputs were there. He could not focus, he could not respond, and his body was not in a state where engaging with the work was possible. But after just five minutes of walking and moving, something shifted. He came back in, sat down, and was able to do exactly what had felt impossible ten minutes earlier. The flow framework explains this through the idea that movement helps regulate the body in a way that makes attention available again (Šimleša et al., 2018). For David, the walk was not a distraction from learning. It was what made learning possible at all.

Less Negative Behavior

The flow state framework talks about how students need to be in the right physical and mental state before they can really get into their work, and one of the things that can get in the way of that is a body that has too much energy and no way to release it (Šimleša et al., 2018). When a student is in that state, they are not in a place where focusing is even possible, no matter how much they are prompted or redirected. This can lead to disruptive behavior. What I saw with David before he was prompted to take a walk was a really clear example of that. Before the walk, he was so physically active that he could not sit still and engage with the work at all. The flow framework would describe this as a student who is stuck outside the conditions that flow needs,

with his body and his attention in a state of psychic entropy rather than focus (Šimleša et al., 2018). The walk gave him a way to reset, and what happened after is exactly what the framework predicts.

Chair Yoga. Out of the three interviews, my last interview with teacher Sarah was the biggest advocate for in-class movement of the teachers I interviewed. She spoke a lot about how they implement movement into their classrooms with chair yoga songs, and also talked about the importance of movement throughout a student's day and how it can benefit their learning environment.

> I do chair yoga with my students in the morning. I also do it in the afternoon, and not just teaching them to do it, just like a regulation strategy, but like explaining the science, and why it's actually helpful to us. (Sarah, 02/27/26)

This teacher's ability to implement movement into their classroom and have it not necessarily be a way to exert physical energy, but more of a way to regulate their students, presents an understanding of movement being used in various ways. This teacher saw movement as an aid for students to calm their bodies and allow themselves to focus their energy on one specific aspect of their school day.

In-class movement can cause rowdiness. But not all the teachers voiced support for incorporating movement in the classroom. One of the teachers that I interviewed (Mary) mentioned that incorporating movement is not her top priority. She indicated that when she implements lessons involving movement, the class tends to get rowdy. She mentioned that she thought movement was important, but she was talking about outdoor recess time, and being in nature, and advocated a lot for Apple to be able to have the funds to get a playground. But she felt overall that when talking about incorporating movement in the classroom space, she didn't

feel it worked effectively to compensate for the lack of outdoor recess, and therefore, it was not one of her top priorities. She stated:

> I definitely don't stop for, like, movement breaks where I know a lot of other teachers prioritize movement breaks a lot. We definitely have the freedom to do that. I think it sometimes causes more disruption. To do, like, the fun movement breaks, then you have to, like, get them back. Right. To be well tracked. (Mary, 02/23/26)

I found this to be very interesting because the teacher works in an elementary school, and I hadn't really heard about this perspective of teachers viewing managing movement activities within her classroom as creating greater classroom management challenges, and how it's a lot more distracting than it is helpful. What the flow framework would say about this is that it is not necessarily that movement does not work, but that the way it is being structured matters a lot. When movement breaks do not have a clear on and off ramp, students have a hard time switching back into a focused state, and the executive attention that is needed to make that shift gets used up on managing the chaos of getting back on track instead of on the learning itself (Šimleša et al., 2018). Further, it could be that without outdoor recess to get out pent-up energy, then the smaller movement activities in the classroom may be counter-productive, as this teacher found.

The flow state framework helps explain why in-classroom movement breaks, if not structured well, can actually work against the conditions needed for flow rather than support them. One of the things the framework is clear about is that for movement to support focus and engagement, there needs to be a clear transition into and out of the movement activity, so students know what is expected and can shift back to learning mode without losing momentum (Šimleša et al., 2018). When movement breaks feel open-ended or hard to wrap up, they disrupt

the rhythm of the classroom rather than helping it, which is exactly what this teacher experienced.

Smoother Transitions

One of the things the flow framework talks about when it comes to transitions is that students do better when they have a clear sense of what is coming next in their day (Šimleša et al., 2018). When students know that a movement break is built into the schedule, it changes how they approach the work that comes before it. Instead of feeling like they are stuck in something with no end in sight, they have something to look forward to, which can actually help them stay focused and push through the work they need to get done. The evidence below is a really good example of how knowing a movement break is coming can shift a student's whole approach to their work.

When conducting my interview with Beth, she spoke a lot about how her students react to movement breaks and how it sets them up to be more productive, so that when they can move, they have completed all of the work they were supposed to.

> ...and then I think students also know when they're built into the day. So they kind of know, like, all right, there's a break coming up, so, you know, let me get this work done. And I know, like after this, I get to, you know, like jump around and do some exercise. (Beth, 02/24/26)

What this teacher is describing is actually one of the inputs that the flow framework identifies as important for getting into flow, which is having clear proximal goals and knowing what comes next (Šimleša et al., 2018). When a student knows that a movement break is coming after they finish their work, the work itself becomes the short-term goal they are working toward.

That gives them a reason to focus and a clear endpoint to aim for, which are exactly the kinds of conditions that make it easier for students to settle into their work and stay there. The movement break is not just a reward; it is actually part of what makes the structure of the day work for students.

Teachers Need Recess Too

Teachers made it clear that the lack of outdoor recess was also a problem because during the days with recess in the classroom, teachers did not have a break for supervision of students. When students can go outside every day, it allows teachers to have times where they can have breaks to regroup. This aspect of my project was very eye-opening for me because I had only been focusing on the impact on the students, not thinking about the consequences of no outdoor recess on teachers.

One of the things that came up in their research that I had not really expected was the impact that outdoor recess has on teachers, not just students. A lot of the focus in the research around movement is on what it does for kids, but what I started to hear from the teachers I interviewed was that outdoor recess also gives them something really important: a moment to breathe and reset. The flow framework talks about how everyone in a learning environment needs the right conditions to function well, and teachers are not an exception to that (Šimleša et al., 2018). When teachers are constantly on without a break, their capacity to show up for students in a focused and regulated way is going to be affected, ed too. The evidence below gets at this in a way that I found really honest and eye-opening.

> So I think it also kind of gives us a little brain break because I know usually I kind of put on the video. Sometimes I'll do it with the kids. Otherwise,s I'm just like, I get that

> three-minute breather. like, there's no questions, there's no comments, you know. I can just kind of relax. (Beth, 02/24/26)

What Beth is describing here is something that the flow framework would actually support, even though the framework is usually talked about in terms of students. The idea that a person needs moments to step back and reset to stay engaged and effective is not just true for kids. Teachers are in the classroom all day managing behavior, delivering instruction, and responding to the needs of twenty or more students at once. When outdoor recess gives teachers even just a few minutes of quiet, that is not wasted time. That is the kind of reset that helps them come back to the classroom more regulated, more patient, and more ready to be present for their students. Losing outdoor recess does not just affect students. It affects the whole classroom environment, including the person at the front of the room who is doing the work of making learning happen (Šimleša et al., 2018).

Conclusion

Summary of Main Findings

This research project set out to look at how movement, specifically outdoor recess, indoor recess, and in-class movement, impacts focus, behavior, and transitions in a third-grade classroom at Apple Academy, a low-income elementary school with limited resources for structured movement. Across my observations and interviews, three main themes kept coming up, and they all pointed in the same direction: when students had good movement opportunities, especially outdoor recess, things in the classroom went better in really clear and visible ways.

The first big finding was about academic performance. When students came back into the classroom after outdoor recess, there was a really noticeable difference in how ready they were

to learn. They got to their seats faster, stayed on task longer, and were more engaged with the material than they were before recess. One of the most striking moments from my observations was when a teacher turned to me after a particularly smooth station rotation and said, "Is this not a completely different class than this morning?" (Field Notes, October). That one comment said a lot, because it was a day when the morning had been really hard, and then after outdoor recess, something had clearly shifted. Students were focused, quiet, and productive in a way that had not been happening earlier in the day.

The second finding was about negative behavior. What I saw across my observations was that students who had a chance to go outside and run around before coming back into the classroom were noticeably less disruptive than when they had been sitting for long stretches or had indoor recess instead. One student in particular stood out. She had a really hard time settling down when she had not had outdoor time, and that would show up in how she treated the adults around her, including me. After outdoor recess, she was a completely different person. She was more open to feedback, more willing to work, and a lot kinder toward the people in the room. She even came up to me without anyone prompting her and apologized for something she had said earlier in the day, explaining that it was because she was frustrated with her work (Observations, October). That kind of self-awareness and social behavior is not something that showed up when she had been cooped up inside.

The third finding had to do with transitions, and this is where outdoor versus indoor recess showed the most obvious contrast. Teachers described outdoor recess as creating a really clear, physical break in the day, one where students could feel themselves leaving one thing and coming back to another. The stairs, going outside, coming back in, those were all signals that helped students shift gears. Indoor recess did not have that same quality. Multiple teachers talked

about how hard it was to get students settled after indoor recess, with one describing it as a consistent loss of the first fifteen minutes of the next block of learning time (Mary 02/23/26). That is a significant chunk of the school day, and it was happening regularly because the structure of indoor recess was not setting students up to come back ready to learn.

In-class movement showed up in more mixed ways. Some teachers were using it really thoughtfully, like the teacher who did chair yoga every morning and afternoon as a regulation strategy, not just as a way to get energy out (Sarah, 02/27/26). That kind of intentional, calm movement was helping students settle before learning rather than exciting them in a way that was hard to come back from. On the other hand, one teacher shared that she did not use movement breaks in her classroom because she found that they caused more disruption than they helped, and getting students back on track afterward was too much to manage (Mary, 02/23/26). That perspective was really interesting to hear, because it showed that movement is not a one-size-fits-all solution, and the way it is structured matters a lot for whether it is going to help or hurt what is happening in the classroom.

Theoretical Implications

When I look at what my findings showed and compare them to the flow state framework that guided this research, there is a lot that lines up in really meaningful ways. The theoretical framework used in this study was the Flow Engine Framework, developed by Šimleša et al. (2018), which describes flow as a state of deep focus and optimal engagement that happens when the right conditions are in place. Those conditions, or inputs as the framework calls them, include a balance between how hard a task is and how skilled the student is, clear goals to work toward, and immediate feedback on how things are going. When those inputs are in place, students can

move into a focused, absorbed state where they are doing their best work. When those inputs are missing or disrupted, flow cannot happen, and that tends to show up as boredom, anxiety, off-task behavior, and lost learning time.

What my data tells us about flow is that movement, specifically outdoor recess, is one of the most practical and effective ways to create the conditions that flow needs. Before outdoor recess, students in this classroom were often in a state of what Csikszentmihalyi called psychic entropy, a disorganized, unfocused mental state that gets in the way of real engagement (Šimleša et al., 2018). After outdoor recess, that state shifted. Students were regulated, their attention was available, and they were able to engage with the work in front of them in a way that looked a lot like what the flow framework describes as the beginning of a flow experience. The movement of recess was essentially resetting the conditions that flow needs to start.

The contrast between outdoor and indoor recess also tells us something really specific and useful about flow. Indoor recess, as it was structured at this school, was bringing students back into the classroom right at their peak energy level, which is the opposite of what the flow framework says students need in order to focus (Šimleša et al., 2018). Flow requires that students be in a state where their attention can settle, and when they are at their highest energy point, that settling cannot happen. This means the structure of the recess schedule itself was actively working against the conditions that flow needs, not because movement is bad, but because the timing and format of the movement was not set up in a way that helped students regulate before returning to learning.

In-class movement, when it was done in a calm and structured way like chair yoga, was also connected to what the flow framework says about the role of regulation in getting into a focused state. That teacher was using movement not to release energy but to help students settle,

which is very much in line with what flow research says about the importance of getting students into the right attentional state before asking them to engage with hard work. On the other hand, unstructured or high-energy movement breaks that did not have a clear endpoint were disrupting the rhythm of the classroom and making it harder for students to get back into a focused state, which is also exactly what the flow framework would predict (Šimleša et al., 2018). How movement is used matters just as much as whether it is used at all.

What this data adds to what we know about flow is that the framework is not just useful for thinking about what happens during learning, but for thinking about what needs to happen before learning. The inputs of flow do not appear out of thin air. They have to be created, and movement, when it is structured thoughtfully, is one of the most direct ways to create them. This is especially important in elementary school settings where students are still developing their ability to regulate themselves and sustain attention over time. For these students, the conditions for flow cannot be assumed. They have to be built into the structure of the school day.

Practical Implications

One of the most important things I took away from this research is that it changed the way I think about what it means to teach well. Before doing this study, I knew movement was important for kids, but I thought about it more as a nice addition to the school day rather than something that is essential to whether or not learning actually happens. After spending time in this classroom and seeing the difference that outdoor recess made in how students were able to engage, I think about movement completely differently now. It is not separate from learning. It is part of what makes learning possible.

Because of what I found in this research, I know that when I have my own classroom, I am going to be really intentional about movement, not just as something students get to do, but as something I plan around and design for. One of the most concrete examples of how I already think about this comes from lessons I designed at Apple Academy called Subtraction Scoot. The activities were built around having students move around the room to solve three-digit subtraction problems in various ways. Instead of sitting at their desks and working through a worksheet. The lessons were designed for third graders who were working on subtraction with and without regrouping, and the movement was not just a bonus; it was built into the core structure of how the activity worked.

Below are the lesson plans that I constructed after I had done my interviews, observations, and overall had a better idea of what was necessary to have a complete lesson plan.

SUBTRACTION SCOOT

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- students will be learning how to use different types of movement throughout activities while also staying focused and productive
- Students will be engaging in movement and working on their collaborative skills by workign in groups
- Understand the process of subtracting 3-digit numbers (with and without regrouping)

MATERIALS

- printed or written out subtraction problems
- sheets of paper
- pencils/ erasers

INTRODUCTION

I will have the class sit on the rug and tell them about what the activity is. then I will review how to do 3 digit subtraction in a whole class discussion with 1-2 examples, one without regrouping and one with regrouping.
examples:
503 – 187 = 316 and 764 – 342 = 422

ACTIVITY BREAKDOWN

Setup

- Place problem cards around the room (walls)
- Each card has a different 3-digit subtraction problem
- Directions to Students
- Start at a card
- Solve the problem on your recording sheet
- When the timer goes off (about 1 minute), "SCOOT" to the next problem

Rules

- Bring only your recording sheet and pencil
- Work quietly and independently
- Try your best—don't skip!

HUMAN NUMBER LINE

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- Students will model subtraction using body movement on a number line.
- Students will understand place value and regrouping through physical movement.
- Students will record and solve 3-digit subtraction equations.

MATERIALS

- •Tape (for floor number line)
- •Number cards
- •Whiteboards
- Markers

INTRODUCTION

I will have the class sit on the rug and explain what a number line is and how we use it for subtraction. I will walk through 1-2 examples on the board, showing students how to start on a number and move backward to subtract. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

•Use tape to create a large number line on the classroom floor.
•Prepare number cards for each stopping point on the line.
•Set up whiteboards at a recording station for students to write equations.

Rules

- Wait for the problem to be given before moving.
- Step carefully and stay on the number line.
- Write your equation down after each problem.

RELAY RACE SUBTRACTION

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- •Students will solve subtraction problems collaboratively through a relay.
- •Students will practice 3-digit subtraction with and without regrouping.
- Students will work as a team and take turns completing steps of a problem.

MATERIALS

- •Whiteboards or chart paper
- •Markers
- Problem cards

INTRODUCTION

I will have the class sit on the rug and explain how a relay race works in the context of math. I will walk through how to break a 3-digit subtraction problem into steps, and explain that each team member will complete one step before passing it on. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

•Divide students into equal teams.
•Place a problem card at the front of the room for each team.
•Set up whiteboards or chart paper at each team station.

Rules

- Only one person runs at a time.
- Walk or jog safely — no pushing.
- Each person may only complete one step before tagging the next teammate.

YOGA AND SUBTRACTION

WARM-UP

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- •Students will calm their bodies while reviewing subtraction facts.
- •Students will practice 3-digit subtraction aloud during yoga poses.
- Students will connect body regulation with academic focus.

MATERIALS

- •Yoga pose cards
- Subtraction flashcards
- Calm music (optional)

INTRODUCTION

I will have the class find a spot in the room where they have space to stretch. I will explain that we are going to start class by calming our bodies and warming up our math brains at the same time. I will demonstrate 1-2 yoga poses and show how we will solve a subtraction problem while holding each pose. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

•Clear space in the classroom so students can stand and stretch comfortably.
•Prepare yoga pose cards and subtraction flashcards.
•Have calm music ready to play in the background if helpful.

Rules

- Hold the pose quietly until it is time to answer.
- Be respectful of the space others need to stretch.
- Do your best — it is okay if you need to think for a moment.

HOPSCOTCH SUBTRACTION

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- •Students will practice subtraction by hopping to correct answers.
- •Students will solve 3-digit subtraction problems mentally and explain their reasoning.
- Students will connect physical movement to math problem solving.

MATERIALS

- Sidewalk chalk or taped floor grid
- Number cards with possible answers

INTRODUCTION

I will have the class sit on the rug and explain how the hopscotch board works. I will show students how the board is laid out with possible answers in each square, and walk through how to solve a problem mentally before hopping to the correct answer. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

- Create a hopscotch board on the floor using tape or chalk with possible answers in each square.
- Prepare number cards with answers that match the problems you will give.
- Make sure there is enough space for students to hop safely.

Rules

- Solve the problem in your head before hopping.
- Hop carefully and one student at a time.
- Be ready to explain how you got your answer.

AROUND-THE-ROOM QR HUNT

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- •Students will solve subtraction problems through a classroom scavenger hunt.
- •Students will solve subtraction problems through a classroom scavenger hunt.
- Students will move around the room while staying focused and on task.

MATERIALS

- •QR codes linked to subtraction problems
- laptops
- •Recording sheets
- Pencils

INTRODUCTION

I will have the class sit on the rug and demonstrate how to scan a QR code on computers. I will walk through what happens when you scan it and show students how to read the problem, solve it on their recording sheet, and use the answer to find the next QR code. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

- •Hide QR codes around the classroom at different spots on the walls and surfaces.
- •Each QR code links to a different 3-digit subtraction problem.
- •Set up tablets or laptops and distribute recording sheets to students.

Rules

- •Move around the room carefully and quietly.
- •Work independently on your recording sheet.
- Do not share answers — everyone solves their own problems.

PARTNER STAND-UP GAME

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- •Students will practice identifying correct subtraction solutions.
- •Students will justify their answers by explaining their reasoning.
- Students will stay engaged and focused through quick physical responses.

MATERIALS

- •Prepared subtraction problems (displayed on board or written on cards)
- Response cards (optional)

INTRODUCTION

I will have the class sit with their partners and explain the rules of the game. I will walk through an example, showing students what to do when they think an answer is correct versus incorrect, and remind them they will need to explain why. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

- •Pair students up and have them sit together.
- •Prepare a list of subtraction problems with one correct and one incorrect answer option for each.
- •Display the problem and answer choices clearly for all students to see.

Rules

- •Discuss with your partner quietly before standing.
- •Be ready to explain your thinking when called on.
- Stand and sit carefully — do not rush or push.

SUBTRACTION DANCE MOVES

SUBJECT	3rd Grade Mathmatics	**DATE**	March 25th, 2026
TOPIC	3 Digit Subtraction	**SECTION**	Grade 3 Woodland Academy

LEARNING OUTCOMES

At the end of the lesson, the students are expected to:

- •Students will connect each step of the subtraction process with a specific movement.
- •Students will use rhythm and dance to reinforce subtraction procedures.
- Students will complete subtraction problems independently after the movement activity.

MATERIALS

- Music (upbeat, appropriate for students)
- Step cards showing each subtraction procedure and its matching move

INTRODUCTION

I will have the class stand up and explain that each step of 3-digit subtraction is going to get its own dance move. I will teach each move one at a time and practice it together before connecting it to the math. We will go through 1-2 examples as a full dance before students try on their own. Examples: 503 - 187 = 316 and 764 - 342 = 422.

ACTIVITY BREAKDOWN

Setup

- •Clear space so students can stand and move at their spots.
- •Prepare step cards showing the move assigned to each subtraction step.
- •Queue up music to play during the activity.
- •Display the move key clearly: Line up numbers = clap, Regroup = spin, Subtract ones = stomp, Subtract tens = snap.

Rules

- •Do the moves at your own spot — be aware of space around you.

Going forward, I want to design lessons that use movement in this same kind of intentional way. That means building movement into the academic structure of the lesson itself rather than treating it as a break from learning. It also means thinking carefully about how I structure those moments so that students have a clear sense of what they are doing, what comes next, and how they are doing, because those are the conditions that move work in support of learning rather than against it. I also want to be thoughtful about transitions in my classroom. Based on what I saw in my research, transitions are one of the most vulnerable moments in the school day, and having a predictable, calming routine that helps students shift from one thing to the next is something I want to prioritize from day one. Whether that looks like a short breathing exercise, a quick physical reset, or even just a consistent signal that something is ending and something new is beginning, I want students in my classroom to always have a clear bridge between activities.

Limitations and Future Areas of Research

There are a few things about this study that are worth being honest about in terms of what it can and cannot tell us. The first is that this research was done in one classroom, at one school, over a limited period of time. Apple Academy is a specific kind of school, a low-income school with limited resources and specific structural constraints around recess and movement, and that context shaped everything I observed. What I found here may not look the same in a different school with different resources, a different schedule, or a different student population. The

findings are meaningful, and they connect to a lot of what the existing research says, but they cannot be treated as something that applies to every classroom everywhere.

The number of people I interviewed is also a limitation. I had three teacher interviews, which gave me some really useful perspectives, but three people are a small number, and the range of viewpoints I got is limited because of that. There were also moments during my observations where I was only able to see part of what was happening, and because I was there as an observer and sometimes as a helper in the classroom, my presence may have had some effect on how students behaved, even if I tried to stay as out of the way as possible.

In terms of where future research could go, I think there are a few really interesting directions. One is looking more closely at what happens when movement is built directly into academic lessons rather than treated as a separate activity. My Subtraction Scoot lesson was one small example of this, but there is a lot more to explore about how to design lessons across different subject areas and grade levels that use movement as a core part of how the learning happens, not just as a break between sitting. Another area that deserves more attention is the teacher side of things. A few of the sources in my literature review touched on how movement benefits not just students but also teachers, and how it can reduce burnout and make the classroom experience more positive for the adults in the room, too. That connection was not something I was able to explore deeply in this study, but it feels important and worth looking into further.

The most important direction for future research, though, is looking at movement equity more seriously. What I saw at Apple Academy showed me that the students who have the fewest resources are the ones who are most likely to have their recess cut, their movement limited, and their access to creative, body-based learning reduced. That is a problem that shows up across

low-income schools more broadly, and the research is clear that it has real consequences for how students learn, how they behave, and how they feel about school. Future research should look specifically at what it takes to protect and expand movement opportunities in under-resourced schools, and what that does for students over time.

Significance

The findings from this research matter for a few different reasons, and I think the most important one is also the most straightforward: students need more recess. Not as a reward, not as something that gets taken away when there is too much to cover for a test, but as a real and necessary part of what makes learning possible. The research is clear about this, and what I saw in my time at Apple Academy confirmed it in ways that were hard to ignore. When students had outdoor recess, they came back into the classroom ready to learn. When they did not, the whole first part of the next block of time was spent trying to get them settled. That is lost learning time, and it is happening because the school day is structured in a way that does not prioritize what students actually need to function well.

The class piece of this matters a lot, too. One of the things that came through clearly in my research and in the literature I reviewed is that not all students have the same access to movement during the school day. Schools that serve low-income communities, like Apple Academy, are more likely to cut recess in favor of test prep, more likely to have limited physical space for movement, and less likely to have the resources to build creative, body-based learning into the curriculum. This means that the students who arguably need movement the most, students who may be dealing with more stress, less stability, and fewer resources at home, are the ones getting the least of it at school. That is not a small or abstract issue. It is an equity issue, and

it is one that shows up in how students perform, how they behave, and how they experience school every single day.

This study is significant because it connects those two things, the research on what movement does for students and the reality of what is actually happening in an under-resourced school, and asks what we can do about it. The answer is not just "add more recess," although that is part of it. It is also about being thoughtful and intentional about how movement is structured when it does happen, making sure it is setting students up to come back into learning ready to focus rather than more wound up than before. It is about teachers having the knowledge and the tools to build movement into lessons in ways that support rather than disrupt the conditions for real learning. And it is about the system making a commitment to treating movement as essential rather than optional, especially in the schools and classrooms where students have the fewest other supports. These students deserve a school day that works for them, and the evidence is there that movement is one of the most powerful and accessible ways to make that happen.

References

Abuhamdeh, S., & Csikszentmihalyi, M. (2012a). Attention involvement and intrinsic motivation. *Motivation and Emotion, 36*(3), 257–267. https://doi.org/10.1007/s11031-011-9252-7

Abuhamdeh, S., & Csikszentmihalyi, M. (2012b). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and Social Psychology Bulletin, 38*(3), 317–330. https://doi.org/10.1177/0146167211427147

Action Learning in Practice. (2026). *Action learning in practice.* Google Books. https://books.google.com/books?id=_56A1ucCuzoC

Alibali, M. W., & Nathan, M. J. (2012). Embodiment in mathematics teaching and learning: Evidence from learners' and teachers' gestures. *Journal of the Learning Sciences, 21*(2), 247–286. https://doi.org/10.1080/10508406.2011.611446

Alsubaie, M. (2015). Hidden curriculum as one of the current issues of curriculum. *Journal of Education and Practice, 6*(33), 125–128. https://files.eric.ed.gov/fulltext/EJ1083566.pdf

Barros, R. M., Silver, E. J., & Stein, R. E. K. (2009). School recess and group classroom behavior. *Pediatrics, 123*(2), 431–436. https://doi.org/10.1542/peds.2007-2825

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology, 59*, 617–645. https://doi.org/10.1146/annurev.psych.59.103006.093639

Blakemore, C. L. (2003). Movement is essential to learning. *Journal of Physical Education, Recreation & Dance, 74*(9), 22–25. https://doi.org/10.1080/07303084.2003.10608514

Blatchford, P. (1998). *Social life in school: Pupils' experience of breaktime and recess from 7 to 16 years.* Falmer Press.

Bloome, D. (2013). Classroom ethnography. In *Language, ethnography, and education* (pp. 7–26). Routledge.

Burawoy, M. (1991). *Ethnography unbound: Power and resistance in the modern metropolis.* University of California Press.

Centers for Disease Control and Prevention. (2010). *The association between school-based physical activity, including physical education, and academic performance.* U.S. Department of Health and Human Services.

Centers for Disease Control and Prevention. (2017). *Strategies to prevent obesity and other chronic diseases: The CDC guide to strategies to increase physical activity in the community.* U.S. Department of Health and Human Services.

Cochran-Smith, M., & Lytle, S. L. (2015). *Inquiry as a stance: Practitioner research for the next generation.* Teachers College Press.

Collins, P. H. (2022). *Black feminist thought: Knowledge, consciousness, and the politics of empowerment.* Routledge.

Csikszentmihalyi, M. (1994). *A psychology for the third millennium: The evolving self.* Harper Perennial.

Csikszentmihalyi, M. (2008). *Flow: The psychology of optimal experience.* Harper Perennial Modern Classics.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* Plenum.

Donnelly, J. E., & Lambourne, K. (2011). Classroom-based physical activity, cognition, and academic achievement. *Preventive Medicine, 52*(Suppl. 1), S36–S42. https://doi.org/10.1016/j.ypmed.2011.01.021

Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., Lambourne, K., & Szabo-Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: A systematic review. *Medicine & Science in Sports & Exercise, 48*(6), 1197–1222. https://doi.org/10.1249/MSS.0000000000000901

Engeser, S., & Rheinberg, F. (2008). Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion, 32*(3), 158–172. https://doi.org/10.1007/s11031-008-9102-4

Fedewa, A. L., & Ahn, S. (2011). The effects of physical activity and physical fitness on children's achievement and cognitive outcomes: A meta-analysis. *Research Quarterly for Exercise and Sport, 82*(3), 521–535. https://doi.org/10.1080/02701367.2011.10599785

Foucault, M. (1977). *Discipline and punish: The birth of the prison.* Pantheon Books.

Fredrickson, B. L., & Branigan, C. A. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition and Emotion, 19*, 313–332. https://doi.org/10.1080/0269993044100023

Gallagher, S. (2005). *How the body shapes the mind.* Oxford University Press.

Glenberg, A. M. (2010). Embodiment as a unifying perspective for psychology. *Wiley Interdisciplinary Reviews: Cognitive Science, 1*(4), 586–596. https://doi.org/10.1002/wcs.55

Goldin-Meadow, S. (2011). Learning through gesture. *Wiley Interdisciplinary Reviews: Cognitive Science, 2*(6), 595–607. https://doi.org/10.1002/wcs.132

Greenberg, M. T., Domitrovich, C. E., Weissberg, R. P., & Durlak, J. A. (2017). Social and emotional learning as a public health approach to education. *The Future of Children, 27*(1), 13–32. https://doi.org/10.1353/foc.2017.0001

Guay, F. (2022). Applying self-determination theory to education: Regulation types, psychological needs, and autonomy-supporting behaviors. *Canadian Journal of School Psychology, 37*(1), 75–92. https://doi.org/10.1177/08295735211055355

Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2014). Be smart, exercise your heart: Exercise effects on brain and cognition. *Nature Reviews Neuroscience, 9*(1), 58–65. https://doi.org/10.1038/nrn2298

Howie, E. K., & Pate, R. R. (2014). Physical activity and academic achievement in children: A historical perspective. *Journal of Sport and Health Science, 1*(3), 160–169. https://doi.org/10.1016/j.jshs.2012.09.003

Howie, E. K., Schatz, J., & Pate, R. R. (2015). Acute effects of classroom exercise breaks on executive function and math performance: A dose–response study. *Research Quarterly for Exercise and Sport, 86*(3), 217–224. https://doi.org/10.1080/02701367.2015.1039892

Institute of Medicine. (2013). *Educating the student body: Taking physical activity and physical education to school.* The National Academies Press.

Jennings, P. A. (2015). *Mindfulness for teachers: Simple skills for peace and productivity in the classroom.* W. W. Norton & Company.

Lazar, S. W., Kerr, C. E., Wasserman, R. H., Gray, J. R., Greve, D. N., Treadway, M. T., McGarvey, M., Quinn, B. T., Dusek, J. A., Benson, H., Rauch, S. L., Moore, C. I., & Fischl, B. (2005). Meditation experience is associated with increased cortical thickness. *NeuroReport, 16*(17), 1893–1897. https://doi.org/10.1097/01.wnr.0000186598.66243.19

Lewallen, T. C., Hunt, H., Potts-Datema, W., Zaza, S., & Giles, W. (2015). The Whole School, Whole Community, Whole Child model: A new approach for improving educational

attainment and healthy development for students. *Journal of School Health, 85*(11), 729–739. https://doi.org/10.1111/josh.12310

London, R. A. (2019). *Unplugged: How recess is transforming American elementary schools.* Harvard Education Press.

MacDonald, R., Byrne, C., & Carlton, L. (2006). Creativity and flow in musical composition: An empirical investigation. *Psychology of Music, 34*(3), 292–306. https://doi.org/10.1177/0305735606064838

Mahar, M. T., Murphy, S. K., Rowe, D. A., Golden, J., Shields, A. T., & Raedeke, T. D. (2006). Effects of a classroom-based program on physical activity and on-task behavior. *Medicine & Science in Sports & Exercise, 38*(12), 2086–2094. https://doi.org/10.1249/01.mss.0000235359.16685.a3

Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 89–105). Oxford University Press.

Pellegrini, A. D. (2005). *Recess: Its role in education and development.* Lawrence Erlbaum Associates.

Pellegrini, A. D., & Bohn, C. M. (2005). The role of recess in children's cognitive performance and school adjustment. *Educational Researcher, 34*(1), 13–19. https://doi.org/10.3102/0013189X034001013

Pellegrini, A. D., & Davis, P. D. (1993). Relations between children's playground and classroom behaviour. *British Journal of Educational Psychology, 63*(1), 88–95. https://doi.org/10.1111/j.2044-8279.1993.tb01043.x

Pellegrini, A. D., & Smith, P. K. (1993). School recess: Implications for education and development. *Review of Educational Research, 63*(1), 51–67. https://doi.org/10.3102/00346543063001051

Ramstetter, C. L., Murray, R., & Garner, A. S. (2010). The crucial role of recess in schools. *Journal of School Health, 80*(11), 517–526. https://doi.org/10.1111/j.1746-1561.2010.00537.x

Rhea, D. J., Rivchun, A. P., & Pennings, J. (2009). The LiiNK Project®: Effects of multiple recesses and character curriculum on classroom behaviors and listening skills in grades K–2. *ICHPER–SD Journal of Research, 4*(1), 1–6.

Robinson, P. E. (2013). An ethnography of classrooms. In *Contemporary research in the sociology of education* (pp. 251–266). Routledge.

Schonert-Reichl, K. A. (2017). Social and emotional learning and teachers. *The Future of Children, 27*(1), 137–155. https://doi.org/10.1353/foc.2017.0007

Šimleša, M., Guegan, J., Blanchard, E., Tarpin-Bernard, F., & Buisine, S. (2018). The Flow Engine Framework: A cognitive model of optimal human experience. *Europe's Journal of Psychology, 14*(1), 232–253. https://doi.org/10.5964/ejop.v14i1.1370

Varela, F. J., Thompson, E., & Rosch, E. (1991). *The embodied mind: Cognitive science and human experience.* MIT Press.

Zubair, A., & Kamal, A. (2015). Work related flow, psychological capital, and creativity among employees of software houses. *Psychological Studies, 60*(3), 321–331. https://doi.org/10.1007/s12646-015-0330-x