

Chapter 11

Crystallizing Moments: Teacher–Student Interaction and Engagement in Online Primary Grades Education

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ABSTRACT

The COVID-19 pandemic has forced K-12 teachers to think differently about their teaching methods. Primary grade teachers must especially consider how to make online learning engaging, motivating, and as hands-on and developmentally appropriate as possible for young learners. This chapter provides insight into purposely created and child-centered crystallizing moments, in which research-based strategies can enhance teacher-student interaction and engagement. Examples from real-world teaching practice are included.

INTRODUCTION

As the central theme of this book stresses, the COVID-19 pandemic has forced K-12 teachers to think differently about their teaching methods. Primary grades teachers, students, and parents have faced an especially rough transition (Rasmitadila et al., 2020) because of a mismatch between typical online education methods and the need for developmentally appropriate and hands-on learning for young learners. Simultaneously, twenty-first century learning and skills, such as communication, collaboration, creativity, and critical thinking, are more critical now than ever before (Guo & Woulfin, 2016). Curriculum, instruction, and assessment (Beebe et al., 2010) are crucial concerns when transitioning to online learning models. Teachers who have suddenly switched to online modalities may lack knowledge regarding

DOI: 10.4018/978-1-7998-7222-1.ch011

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best practices for online teaching, especially student engagement. Teachers may also lack the confidence in their ability to effectively communicate, demonstrate, and act creatively with their students through an online platform. A new and mindful approach to helping these teachers move forward is necessary. Educators encounter challenges with redesigning curriculum to be compatible and effective online. One key to enhancing teacher-student interaction and engagement in online primary grades classrooms is the concept of *Crystallizing Moments* (Gardner, 1991; Murphy, 2016), which is the focus of this chapter.

Murphy (2016) emphasizes that Gardner's (1991) concepts of crystallizing moments can happen at any time, upon any moment in a day, without the ability to plan the moment(s). Crystallizing moments are any experience, positive or negative, leaving a lasting impact on the learner, and are deeper than a mere epiphany. The feeling left from the moment of crystallization cannot be undone, erased, or eradicated. Crystallizing moments forge the learner and impact their approach to both learning and learning environments. Remaining cognizant of this concept is vital to remain fully present when with students. Educators always hope students will have an enlightening moment and the memory be positive and exciting. However, no matter how hard teachers try, crystallization may also occur when teachers perform at their worst. Every teacher has feelings of worry and not getting across to students. It is normal and natural to feel this way and is possibly why teachers constantly self-evaluate and strive to continue improving their lessons, delivery, and presentation to their classroom. Teachers are always students themselves, and with this in mind, they too experience crystallizing moments that are unexpected and beneficial to their growth experienced each year.

In March 2020, the entire country faced an exponential shift in classroom delivery. Veteran teachers and novice teachers alike found themselves learning how to create a seamless interaction across a screen. Was there a necessity to only use high-tech systems and online software, or could those moments of personal interaction, classroom sharing with peer collaboration in real-time, and the never-ending curiosity of crystallizing moments? When, where, and how these things occurred would be left to discover.

Whether learning occurs in person, remote, online, or hybrid, experts agree that a positive learning environment is crucial (Fisher et al., 2021). Differentiated Instruction (Tomlinson, 2014) is also key to creating and maintaining engaging learning environments. Differentiated Instruction allows for more student choice by nature and design and is thus more child-led and child-centered than more traditional types of classroom-based instruction. The individualization possibilities within the philosophy of Differentiated Instruction connect with the process involved in creating the *Crystallizing Moments*. These concepts, especially in the primary grades, are discussed later in this chapter. Differentiated Instruction in the primary grades is a powerful tool for reaching and engaging young learners who undergo rapid development. For example, a primary classroom can have students at various levels, such as reading levels and readiness. In the online environment, differentiation is attainable through work modifications without restricting access to the whole lesson or peer interaction (Brodersen et al., 2017). It is also imperative to consider Developmentally Appropriate Practice in Online Education for young learners (Parette et al., 2010). As many parents and teachers realize today (and have especially come to realize during the COVID-19 pandemic), the use of technology for primary grades children is not inherently against the fundamentals of Developmentally Appropriate Practice. It can help to develop necessary twenty-first century learning and skills. However, instructional use of technology should be accomplished mindfully, with the whole and individual child in mind.

The COVID-19 pandemic significantly increased primary grades students studying online and teaching and learning modalities, such as video conferencing (especially using Zoom). Most U.S. children attended school at least partially online for some duration during the pandemic. Most K-12 schools scrambled to

provide emergency remote learning in place of traditional on-ground instruction beginning in March of 2020. The emergency transition to online and distance learning during COVID-19 was not the same as ongoing and established programs, chosen as options for parents, students, and teachers. Still, it is more akin to *crisis teaching* or *emergency teaching* (Mutton, 2020). Policymakers and other stakeholders fought to keep schools closed in the fall of 2020 due to growing safety concerns (Will, 2020). Many educators felt that they were not adequately prepared for online and hybrid models, citing a lack of planning and resources. Fisher and Frey (2020) stressed that teachers were especially concerned about their roles during this unique and ever-evolving period. COVID-19 has brought many simmering issues to light and made everything about online and remote education far more mainstream in the discussions for parents, teachers, and others in society. Student participation is not an option; it is a requirement for learning. Therefore, the learning process must shift from teacher-centered to student-centered with maximum engagement opportunities. This chapter describes research supporting the notion of *Crystallizing Moments* and examples from real-world teaching practice. Background information and literature relating to the critical concerns about *Crystallizing Moments* in online primary grades education is presented, followed by a descriptive case study of a first-grade student involved in one-to-one online learning experiences with a teacher-researcher. Primary grades teachers who are increasingly teaching online can consider scaling these *Crystallizing Moments* to their specific online teaching and learning situations.

BACKGROUND

Teachers rely heavily upon in-person observations of students within their brick-and-mortar classrooms for self-reflection and adjustments to lesson plans, student interventions, and designing appropriate activities and lessons. Replicating this type of ongoing ability to observe, self-reflect, and monitor and adjust (Hunter, 1994) can be problematic in the online learning environment. Online learning in the primary grades is not as popular as in other grades/levels. In the 2017-2018 school year, only “3 percent of primary schools offered any courses entirely online” (NCES Fast Facts Tool, n.d., p. 1.) in the U.S. Globally, the statistics are similar (Barbour et al., 2011). For example, in South Korea, “Online education available for primary school students are few, and online supplement and support systems available for the formal school curriculum are even fewer” (Lee et al., 2013, p. 69).

Globally, few schools utilize online modalities for the primary grades, either part-time or full-time for students. The existing evidence clearly shows (Lee et al., 2013) that young students prefer a more human touch. Video conferencing between teacher and student is encouraged. The following example details student feedback on a specific Cyber Home Learning System (CHLS) and a CHLS with a video conferencing element (CHLS-VC):

First, it was found that primary level students preferred CHLS-VC over CHLS and found it recommendable. The teacher’s friendliness was considered highly positive with 99.0%. Making synchronous interaction available seems to have increased the humanness in the online environment, which seemed to have caused the students to appreciate the video conferencing feature of the CHLS-VC. (Lee et al., 2013, p. 75)

An additional concern is that most current online learning practices are not developmentally appropriate or geared toward primary grades learners. According to Bowdon (2020):

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When schools suddenly closed down last March, many teachers lacked experience using technology to instruct students and connect with them. In early childhood and early elementary school classes, this challenge was compounded by the fact that many teachers consider e-learning to be developmentally inappropriate for younger students. Teachers' years of experience told them that rather than sitting and learning passively by staring at computers or tablets, young learners need to move their bodies, practice their fine motor skills, interact with peers, use manipulatives, and play. (p. 1)

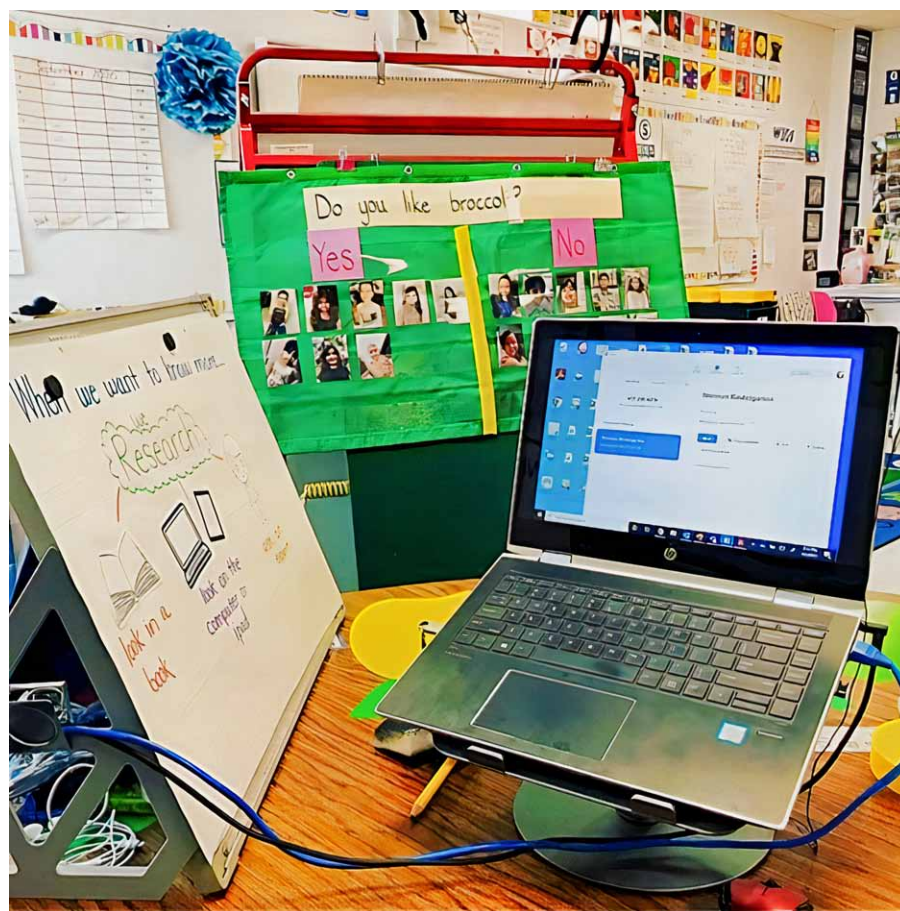
Now, teachers must recreate their teaching practices to address new gaps developing from the lack of technology, access, understanding of how to use the technology (teacher, student, and parent), and effectively communicating these gaps. Keeping in mind that children drive creative and interactive learning processes, designing and developing a curriculum that represents effective learning is crucial at this juncture and no longer resembles the practices that teachers, students, and parents have become accustomed. *Crystallizing Moments* (Gardner, 1991; Murphy, 2016) can serve to escape a sterile application of lessons, such as using classroom worksheets and not altering them to be more interactive for online learners. Rather than using the worksheet, the teacher may find it more engaging and beneficial to keep young learners using their hands, creativity, and voice while they work and discover. For instance, Figure 1 displays a kindergarten teacher's approach to using technology to meet with the class. The teacher is still using handmade objects and creativity to engage the young learners in the group discussion. The students then have written activities they can display by holding them up for the rest of the class to see. Later, parents upload the documents to SeeSaw (SeeSaw, 2021). Additionally, the 10-year veteran teacher comments, "This has been my view for an entire year now. I teach to a computer and pray the littles on the other side are getting it" (Hand in Hand in Kinderland, 2021).

COVID-19 spurred a monumental shift in the classroom, parent involvement, and the newly defined roles students, teachers, and parents had to adopt. In an instant, learning became inclusive of the entire family, remote, foreign, and disruptive for a traditional classroom's known and learned behaviors. The concept of learning no longer meant being physically present through the learning process with the guidance of a teacher and peers' support for comprehension and deeper connections (Vygotsky, 1978). The question becomes, can a meaningful curriculum be adapted from a learning kit or pre-prescribed curriculum while still piquing the interest and curiosity of the learner? Kohn (2006) contends that denying students a voice does not make problems or issues disappear. Instead, a denial drives the problems to manifest themselves in less productive and often destructive manners.

Kohn (2006) posits a profound need for a student-focused curriculum, where discipline is explored, learned, applied, and thoroughly developed through the curriculum, not as a contingency of the curriculum (Adler, 1955). Geographer Soja (1996) explores thirdspace theory concepts as the space between physical worlds, such as a valley between two mountains or the border between Mexico or Canada and the United States. Within this space exists extreme diversity that negotiating without neglecting the cultures and individuals found within each area. Similarly, students, parents, and educators find themselves dealing with similar territory. As students, families, and teachers migrated into online instruction and learning, there was a more profound sense of thirdspace to consider. On one side of the screen, the teachers are presenting. On the other side, the students are receiving information. Space in-between delivery and reception is of intense interest to the authors. Bridging the gap between school and home is crucial. Learning across a screen meant navigating a new level of thirdspace (Soja, 1996). The question and concern became an element of time and space. As a 20-year veteran teacher recently expressed,

I can't stand programs where I can't directly monitor my kids. So, things like Quizziz, Kahoot, etc., move fast, and I want to see specific data. They [school] have us using Smart Learning Suite, but for some kids, it moves too slow and others too fast. I'm all about connections, but because we aren't together physically, I already lost the power to fully connect. So now, it's called survival. (personal communication with the author, December 9, 2020).

Figure 1. Kindergarten online teaching from the teacher's perspective



Lu and Hao (2014) examine young children's internet use at home and school. They stress the importance of understanding children's internet use in formal versus informal settings while looking toward a future with more blurred lines and less obvious distinctions about children's internet usage.

The human connection is paramount, whether learning occurs in person or online. Many schools and teachers utilize pre-recorded videos, apps, and similar types of technology for online learning, and these tools can certainly be helpful. However, that human connection is especially crucial for young learners in primary grades classrooms. Creating and finding opportunities for more organic teacher-student engagement via *Crystallizing Moments* is vital. Utilizing more synchronous videoconferencing with

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face-to-face interaction and hands-on activities can enhance engagement and make the most of online teaching and learning experiences.

Emphasis on Creativity and the 4Cs

It is crucial to make online learning as engaging, motivating, hands-on, and developmentally appropriate as possible. In reaction to non-stop accountability-based and assessment-driven policies over the past two decades, creativity and all 4Cs are regaining prominence. Guo and Woulfin (2016) explain the global trend, especially how “recent years have witnessed a renaissance of global creativity in education...U.S. policymakers and educators have also begun to notice the importance of creativity in maintaining and improving global competitiveness.” (p. 154). The Partnership for 21st Century Learning (2019) denotes the 4Cs of 21st Century Learning, including communication, collaboration, critical thinking, and creativity. Schleicher (2018) connects research, policy, and practice with specific strategies for building twenty-first century schools, while Robinson (2011) stresses that creativity is most missing from today’s public schools. Reflecting further on creativity as a crucial aspect of the 4Cs, Guo and Woulfin (2016, p. 157) make a clear distinction between what they term “creative and novel activities.” Novel activities may help to attract and engage students but may also be merely superficial and not necessarily involve higher-order thinking skills, such as creativity and problem-solving.

The authors stress teachers’ independent roles in being flexible and adaptive toward students’ needs, especially in terms of creative expression and problem-solving; “it is vital to raise the capacity of administrators and teachers so their students can receive creative instruction that matches P21” (Guo & Woulfin, 2016, pp. 159). The 4Cs are highly relevant to making online learning more engaging, motivating, and hands-on. A common choice is to utilize more apps and other online learning tools that do not directly involve teacher-student interaction. As will be shown later in this chapter via the case study of an online primary grades learner, the 4Cs are often better integrated via videoconferencing using hands-on items in the learner’s hands and shared and explored with the teacher during live sessions.

THE REGGIO EMILIA LENS

Teachers of primary grades students may be familiar with the work of Reggio Emilia. The Reggio Emilia Lens connects directly to focus on creativity and creative thinking described above. It reminds educators that a child’s ability to learn, explore, create, and deliver information is lifelong. In contrast, some teaching and learning in typical K-12 schools have become sterile, a laminated lady (Murphy, 2016) of sorts, squashing a student’s instinct to look beyond the boundaries of a scripted curriculum. Now more than ever, educators, parents, and students are confronted with learning to find their voice and express their voice in a classroom that may not be face-to-face and further hinder the understood practice of what it means to teach it means to learn. However, if educators focus on the learner’s lens and allow them more space to create and manifest ideas (even through interactive, virtual practices), elementary through middle school children can find their way back to being learners and doers of education. To be a doer of education stems from the concepts of being doers of math, which in short means how children understand math and how they perceive themselves as math students (NCTM, 2008; Rock & Shaw, 2000; Steele, 1999).

Jensen (2016) posits mastery of information as “a process and destination...about developing lifelong skills...that makes complex, challenging learning worthwhile” (p.136). Classrooms should be an opportunity for teachers to create a safe space for students to grow and experience a life where all voices are valued and shared (Çubukçu, 2012; Jensen, 2016; Lickona, 1991 Rosenblum & Travis, 2016; Williamson, 2016). Teachers possess an opportunity to create a climate where students develop rapport, are encouraged to take academic risks, explore boundaries, and learn through shared life experiences (Jensen, 2016). Effectively using online platforms’ principles and tools, mixed with curated learning modules, encouraged and fostered students’ voices, real-time feedback, and genuine engagement can shift a student’s experience with online learning.

Meacham and Atwood-Blaine (2018) echo these calls for genuine engagement with their description of the Reggio Emilia-inspired Lego Robotics club’s impact. Authentic learning experiences are essential for engaging younger learners, and the school environment plays a prominent role. Similarly, Fernández Santín and Feliu Torruella (2017) connect the Reggio Emilia lens and approach to critical thinking, emphasizing project-based, open-ended, hands-on, creative projects. Children should not merely be recreating works of art but going deeper into creativity and critical thinking. The authors elaborate that the Reggio Emilia approach:

is focused on listening and respecting the children for the potential of witnessing their actions, towards reformulating everyday practices, ideas and projects. The schools associated with the Reggio Emilia philosophy, propose a participatory and democratic educational system, that emphasises research and experimentation. (Fernández Santín & Feliu Torruella, 2017, p. 52)

Open-end art creation is a crucial component of this approach and features directly into the process explained and illustrated later in this chapter. Art can help children think critically about content in other content areas, understand it, and internalize it more deeply. Hands-on, play-based activities can indeed occur in online learning environments with some creative thinking and tools. For instance, sharing via webcam, sharing of media via online tools such as Padlet, the use of hands-on materials that the child utilizes at home (such as KiwiCo Kits, which will be explored later in this chapter), and complete and creative integration between the home and school/learning environments.

Where Do Teachers Begin?

Spring 2020 jettisoned the education system into a virtual world. In this world, teachers, students, and parents found themselves lost in translation. How would the work be productive across a screen? How could a child actively learn and participate in lessons when the teacher, referred to by Vygotsky (1978) as the More Knowledgeable Other (MKO), did not feel in control of the learning situation. Veteran teachers regularly find that prior year’s lessons are easily accessible when teaching, frequently going to the arsenal and sticking to the script. There was no longer a script to draw from, no longer an audience that was sterile, predictable, or controllable in one space.

What if the possibility of moving past the tried-and-true lesson plans and twisting the lessons into a newer, technologically applicable model was possible? In a single-student case study, concepts of reimagining the learning experience via Zoom came to fruition. The importance of trying this concept with a first grader in a 100 percent online learning environment will offer teachers and schools to take a step back from survival mode and creatively transition from scripted lessons into a newer chapter of

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learning. During April through November 2020, a first-grade student and a teacher worked through a new world of education together, as illustrated later in this chapter.

Looking at students from the teacher's perspective and the students through a zone of proximal development (Vygotsky, 1978) has pivoted. Suppose considering geographer Soja's (1996) descriptions of thirdspace as a deep-rooted need to analyze what it means to be in a transitional space. People change depending on their environment. For instance, when children are at a birthday party, they respond to the stimulus and excitement a party brings. Most children have exciting and positive experiences at parties, making transitioning from one person's party to the next a familiar and joyous moment. Equally, when children are about to take a test at school, they would possibly be less enthusiastic than they were at the party—each step of the way requires a transition or pivot. The pivot defines how individuals react to that current space and how they adapt to the new space. If students had a negative experience taking tests in other classes, they might enter with a sense of upset, apprehension, and negativity. On the other hand, if they have had positive experiences, they will more than likely have a smoother transition from one space to the next. Each opportunity can manifest a *Crystallizing Moment* (Gardner, 1991).

The same holds for the current pulse of the education system. The pivot between spaces is generating experiences. The experiences will determine whether the moments are positive or negative. Teachers never know when a crystallizing moment (Gardner, 1991; Murphy, 2016) will impact the students, and in this case, teachers and parents too. They must be aware of how to handle the moments and make them as productive as possible. Capitalizing on moments requires flexibility in mindset and strength to draw from previous experiences. Educators have curricula they follow as a guideline. The guideline, being the key term, serves as a guide, not a tombstone. A successful plan is adjusted as it progresses. Teachers must view their classrooms, especially online classrooms, as areas of enormous change and welcome adjustments. Becoming familiar with the tools available in online platforms, such as Zoom, can make the transition more attainable.

Listening to and Observing Students

Like other educators, the teacher-researchers who are the authors of this chapter found themselves in a situation where they had to take a brick-and-mortar, in-person curriculum and find a way to make the learning process successful when the student was in an alternate space. The teacher-researcher is a former high school teacher with more than 20 years of teaching experience in the public and private sectors. Additionally, the teacher-researcher is an educational coach for students, commonly known as a *hakwon* in Korea, meaning a "private tutoring system...that provides students with supplementary, after-school education" (Kim, 2016, p. 3). Limitations of the curriculum became profound as there were no online options or resources. Software and online versions of lessons were not in place for this situation. With that in mind, the researcher became encouraged to pivot and look beyond the papers of the lessons. During this analysis, the proverbial light was lit, and the researcher pushed to interact with the students as if they were in the same room, using chalk talk (Ritchhart et al., 2011). Chalk talk is "building understanding in a collaborative way through putting forward ideas, questioning one another, and developing the ideas further" (Ritchhart et al., 2011, p. 78). The researcher listened to what the student needed, wanted, and what enticed a reaction. The researcher capitalized on the active moments online, desiring to make any form of crystallization a positive experience. Acting upon instinct and over 20 years of teaching experience, the researcher pivoted and pivoted and pivoted. During each online meeting, the researcher took notes and reviewed them at the end of the day, searching for repetitive themes

from the students and themselves. The researcher often pondered listening to the students and their needs while promoting legitimate peripheral participation (LPP) (Lave & Wenger, 2015). By definition, LPP identifies “learners inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers to move toward full participation in the sociocultural practices of a community” (Lave & Wenger, 2015, p. 29). Lave and Wenger (2015) do not specifically address ‘community’ as a classroom and, therefore, the theory extends into a virtual setting. Was the researcher providing the tools, examples, and information that would make the students learning valuable? Each observation led to another trial. Each session aided in the adjustments implemented to make the time with each student more successful.

All curricula have gaps. Through the experience of watching students struggle to make connections, have a relationship with the material, or even lack the confidence to initiate a conversation of what they do not understand, that prompts a change in implementation or supplementation to the current materials. Krashen (2001) discussed an individual’s inclination to employ incubation, meaning short breaks and time to think are necessary for transferring information. For instance, in writing, allowing the brain a healthy break to process acquired and active knowledge allows for this additional time. An apparent void exists in research concerning vocabulary acquisition for second language application across curricula. Students often account for the lack of knowledge of applying the words from one subject area to another.

Overemphasis on a standardized score to assess students’ language acquisition and connection abilities has become problematic and even harmful to learning outcomes (Herrera & Murry, 2016; Zawacki & Rogers, 2012). Herrera and Murry (2016) discuss destructive issues when teachers *teach a test* [author’s emphasis]. The heavy focus on strategies to pass a state or other standardized exam, rather than learning how to make deeper connections with the material, compromises the recognition of content outside of the “test setting” (p. 50). This issue is not limited to native speakers of English. The classrooms’ demographic diversity calls for educators to dig deeper and become more willing to pivot from traditional and standard teaching pedagogy.

Furthermore, the cycle diminishes learning opportunities for diverse learners, such as culturally and linguistically diverse (CLD) students. All student populations may experience a “misunderstanding of the role of native language” in a student’s academic development (p. 51) when the focus of learning reduces to “objective” education (McLeod, 2012). Reductionist curricula focus too heavily on the value of regenerating information without application, meaning students, CLD and non-CLD alike, are deprived of applying the knowledge into meaningful relationships for future use.

On the other hand, constructivist learning promotes hands-on, progressive education, focusing on individual students’ growth in time utilizing previous knowledge and skills to current (grade-level), in-depth, comprehensive values (Herrera & Murry, 2016; Lickona, 1991; Vygotsky, 1978). Learning more about students through an interview process, often referred to as a student bio, before embarking on teaching them is critical to how a teacher develops lessons and supports active learning, shifting from reductionist approaches (Herrera & Murry, 2016). Student bios are appropriate for all learning populations and were instrumental in Oliver’s (pseudonym) case study progression and success. Additionally, intentional lesson planning with a constructivist lens and a student bio encapsulates the whole-student learner. For example, the sociocultural process, language development, academic development, and cognitive development of each student allow for a pivot in attitude and intention in teaching online. Previous cultural and educational experiences influence each student’s learning process. As the students gain confidence in conversation, language and content development begin to take on a new position in their daily interactions and community involvement. Simultaneously, teachers can effectively and intentionally

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manipulate the focus of academic development (Herrera & Murry, 2016) through deeper connections across the curriculum (McLeod, 2012), through conversation, and with motivation.

Theory into Praxis

Teachers do the best they can with the knowledge they have. The COVID-19 pandemic brought this issue to the surface. When a pandemic interrupts the course of teaching and learning, there is without a doubt uncertainty in the effectiveness of lesson planning and online delivery. Fenty and Brydon (2017) report a lack of teacher readiness, especially at the elementary level, of how to incorporate “knowledge into content-area instruction” (p. 225). Gained learning experiences support the four dimensions – socio-cultural processes, language development, academic development, and cognitive development - to gain richer classroom experiences (Herrera & Murry, 2016). Promoting a similar atmosphere online requires a fresh perspective of how educators deliver content and make student connections. As educators, the authors found themselves in a similar predicament as they relied heavily on reading the room of students and adjusting their delivery according to the audience’s needs. The most significant difference in today’s virtual climate is that educators and students must learn to communicate without being in the same space.

The fear of letting go in any classroom is a concern of all teachers, especially when online. However, shifting the lessons to be student-centric allows the student to remain in control of their learning. When students have a voice in their education, they are more likely to stay engaged (Tomlinson, 2014). With proper planning, the teacher is really in control. Many teachers fear that knowledge acquisition lacks if students are talking or even silent (Herrera & Murry, 2016).

Projects provide daily assessment opportunities through teacher observation, teacher-student communication, milestone checks, direct classroom instruction, student engagement, and formal presentations or project completions. Project learning offsets the concern of diverse learners who may not test well (Herrera & Murry, 2016; Newkirk-Turner & Johnson, 2018) as they have more opportunities to ingest the content. The fear of not having enough time to prepare and modify eases with completing each project, and each project fosters new ideas and modifications to meet all learners’ needs. One way to connect with the students on the other side of the screen is through projects. Project learning holds the advantage of covering multiple state learning objectives daily (TEKS, 2019). This advantage occurs because students work through information at different speeds and then discuss it openly, meaning Student A may be working on the first point. Student B works on the second point, and Student C works on the third point during the same class. This process keeps the project’s objectives active, and the conversations that arise during class discussions evolve the knowledge through peer connections and teacher interaction.

Projects are applicable for any grade level and subject content. They can be cross-curricular or as a single-discipline. Single-discipline projects promote the concepts of constructivist ideologies and content-specific comprehension with links to previous and upcoming concepts. For example, suppose an elementary math class is discussing word problems. In that case, a mini-project can be created revolving around math vocabulary to avoid any language barriers, such as a table where one would eat being confused with a table as in a chart for recording information. This type of project then becomes a personal dictionary that feeds into the learner’s biographical focus. When the time comes for the students to work individually, all students have self-created personally relevant math dictionaries to aid in solidifying concepts and expanding knowledge. Lickona (1991) encourages students to work in various manners, such as jigsaw, cluster groups, small groups, or whole-class projects. Each style focuses on different organizations. A teacher can quickly reformat a lesson for online learning and distribute pieces

to students for small, focused assigned portions followed by presenting in an online discussion. The use of tools, such as screen share and Google Slides, minimizes supplies for successful projects and allows for more substantial use of ZPD online. Students can facilitate working on projects with less hassle as they do not need to leave their homes to meet up with their partners. Guiding students in using online platforms effectively takes practice. Learning is most valuable when the student owns the data.

The Process

The following sections illustrate the ongoing and organic process of continual *Crystallizing Moments* documented in a single case study involving a first-grade student with the pseudonym of Oliver. One of the authors of this chapter, the teacher-researcher, engaged in continual reflection and documentation while engaging with Oliver for several months in an online tutoring capacity. While this case study only provides a glimpse into the online learning experiences of one teacher and student, the overall process and analysis can provide direction for online primary grades teachers in various contexts.

In explaining the approach used during a recent, informal case study, it is essential to disclose that the process developed organically. The action research expanded upon the teacher's dissertation's work (Gallagher-Immenschuh, 2020) and received permission from the student's parent via email to use the work they completed together since the beginning of COVID. It is essential to acknowledge that the teacher and student have worked together in an after-school learning center for three years. Their relationship has depth and trust, making the transition from in-person to online smoother. The parent and researcher also have a strong communicative relationship. The researcher acted as both the teacher and the researcher in this case and had a plan going into each session but was open to the possibility that the lesson would need alterations and remained malleable. The parent involvement in the learning process was intense, making the hiccups of technical issues and supplies less likely to disrupt the learning process and classes. Oliver (pseudonym) is in first grade and had no prior experience or exposure to online learning. Oliver previously attended a traditional brick-and-mortar school. Oliver acquired the skills to learn online as each session progressed.

As the teacher, the researcher made a conscious effort to remain unbiased and uncommitted to the original plan. The focus centered on listening to Oliver and watching him determine what modifications were immediately needed to create meaningful learning experiences. The format required the teacher/researcher to wear the instructor's role and the sounding board for Oliver. This dual role required visualizing their work together to think aloud and promote and engage in a sort of chalk talk (Ritchhart et al., 2011). Through the conversations, they could engage in various in-depth learning, including productive mathematical conversations (NCTM, 2013) extending beyond the problems on the page. Mathematical conversations (NCTM, 2013) allow students and teachers to create an enriched understanding of how math communicates in the world and through one another.

Cross-Curricular Learning

Establishing productive and meaningful learning in any classroom requires skill, focused planning, and knowing your students (Herrera & Murry, 2016), especially when the classroom is virtual. Creating legitimate peripheral participation (LPP) with students, meaning the process of understanding and learning takes place through involvement and not in an "individual mind," is the link between successful and effective learning practices and missed learning opportunities (Lave & Wenger, 1991, p.15). Student

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participation is not an option, rather it is a requirement for learning. Therefore, the learning process must shift from teacher-centered to student-centered with maximum engagement opportunities. Figure 2 displays an example of Oliver's engagement progression during a chalk talk. During a book read from the series *Beep and Bob* (Roth, 2018), Oliver created a parallel universe based on an integrated science lesson about the planets. Using Roth's series (2018) allowed the researcher and Oliver to explore science, language arts, math, art, and social studies. The researcher constructed materials to organize his thoughts and ideas required learning how to make project pieces, such as *Foldables*© (Zike, 2012). Majority of the supplies necessary for this project were readily available to Oliver in his home. The use of standard school supplies generated more inclusivity for students to produce information without resource limitations.

Listening to Oliver as he worked, the project adopted a life of its own, meaning the original layout and lessons were not binding. Screen sharing the interactive National Aeronautics and Space Administration (NASA) website *Space Place* (Erickson, 2021), <https://spaceplace.nasa.gov/menu/solar-system/>, made using valuable content fast and easy. The Zoom call quickly transformed from a two-way communication into an interactive research discovery. Figure 3 and Figure 4 also display the depth this project encompassed. What was most interesting to the researcher as the MKO (more knowledgeable other) was how involved and critical their role as a peer/project buddy was for his continued growth. Everything Oliver did, the researcher did in real-time. Any hiccups the researcher experienced, Oliver witnessed. Oliver had a slight reservation about offering ways to troubleshoot minor problems and would ask the researcher to display online images that the researcher would locate in real-time as he asked questions or craved more information. The interactive cooperation as project buddies became the new lesson plan and focus; The researcher would listen, and Oliver would lead. The researcher planned, and Oliver would find his path. The researcher would pose questions and lead discussions, and Oliver would channel his creativity. His interest in the solar system grew to a point where he made a solar system to authenticate what they discussed. The solar system inspired him to think of new and exciting details for his stories.

Translating these concepts and methodologies became less about the work and more about the student engagement. Looking at the student and his space became a higher priority. The researcher began conducting mini-interviews to see what was of interest to the student and where his curiosity piqued. The mini-interviews were not formal. They were casual and recorded during session notes (Figure 5). The researcher would pose ideas or questions and allow Oliver to discuss. The student's grade level's scope and sequence were present in the questioning process, meaning questions focused on essential learning components. The researcher wanted to find the avenue to create learning excitingly and dynamically while still covering the necessary materials. Rather than taking an assignment and executing it as initially written, the researcher thought considerably about how Oliver interacted with them online. Again, the researcher took notes and evaluated them, always looking for growth opportunities.

KiwiCo

Upon finding a theme of Oliver's love of math, space, reading, adventure, and how things work, the researcher decided to use KiwiCo (KiwiCo, 2021) to implement science projects and literature, a constant theme. This theme transitioned into math as well. Before Oliver completed the project, the researcher placed herself through the process and looked for connections, links, and opportunities for engagement. The researcher felt that a classroom teacher must accomplish this action in an online project with many moving parts. How could the process be unified and unique? Including a piece of literature with each

project enhanced creating an opportunity for a literature-rich, online, engaged project. This flow enabled the researcher and Oliver to deepen content knowledge, remaining involved as learning partners, and understand how to keep a novel as a primary objective to a project. The connections manifested organically through the work and similar outcomes educators would desire in a classroom while watching a group of students working. The KiwiCo (2021) boxes became a means to diversify topics and blend them over multiple disciplines. What the researcher most appreciated about the KiwiCo boxes was the website's free resources for do-it-yourself project ideas and projects, <https://www.kiwico.com/diy> (KiwiCo, 2021). Understanding the constraints classroom teachers experience with budgets, the researcher found that many curated boxes could transpire without purchasing expensive items. This concept became fundamental in thinking of ways to reproduce and produce lower-budget projects with high-quality content. The projects also expanded the researcher's bravery in pushing the envelope and trying projects with numerous facets. After all, the researcher had to learn to follow how a well-curated kit pulled pieces together. Why not push oneself to do something similar? Enter the dream of the coral reef.

Figure 2. Oliver discussing his creation of a parallel solar system



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Figure 3. Oliver recited as researcher typed in real-time the story ideas as he began sketching

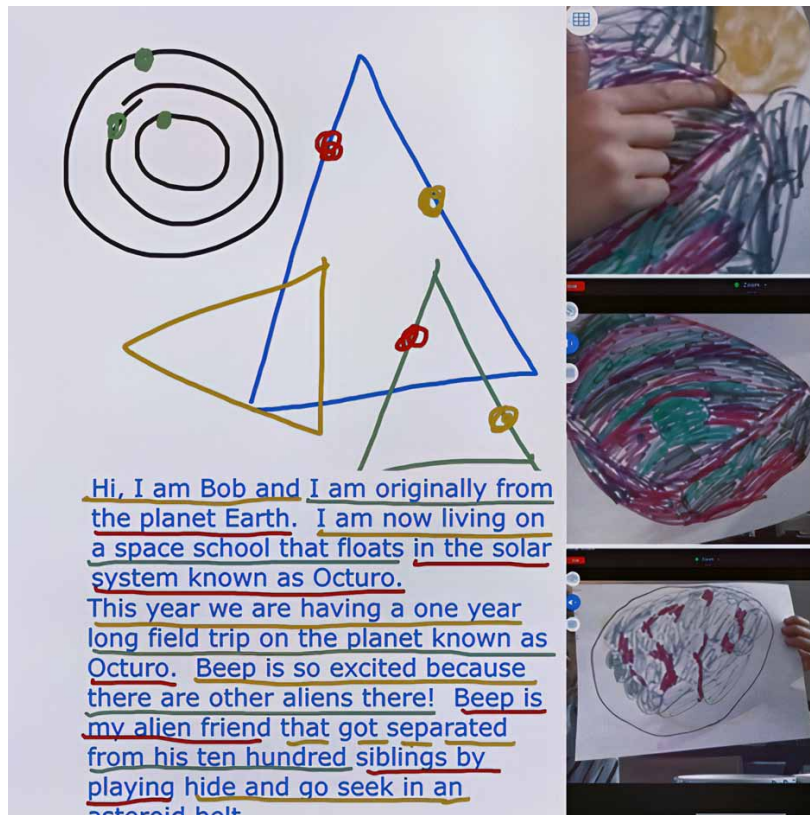


Figure 4. Rounding out Beep and Bob

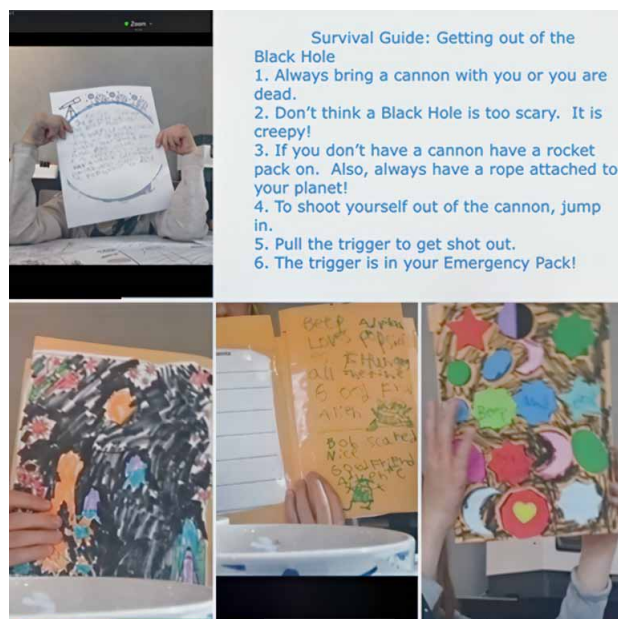
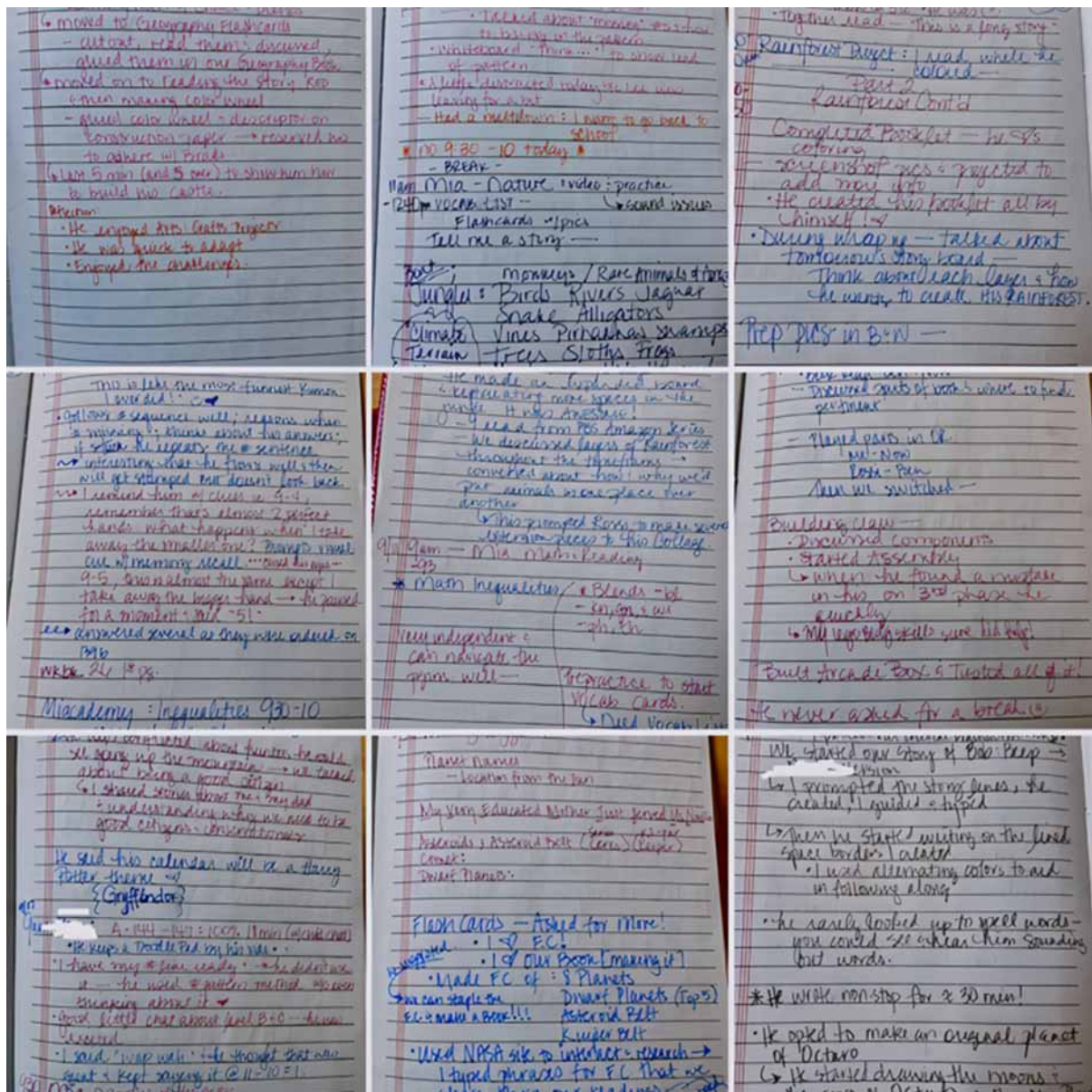


Figure 5. Session and reflection notes



The Coral Reef

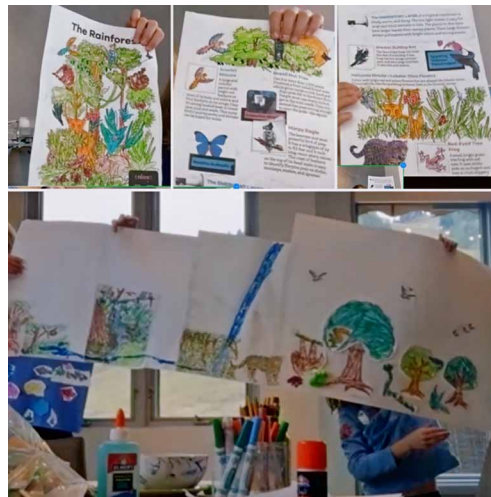
Pushing creativity online in a live Zoom session can be daunting. However, the researcher figured that if the project started going awry, it could be modified, just as would be done in a classroom. The decision to embark on a multi-phased project covering coral reefs was the next area of focus. This project was not a pre-existing project, nor was it an online kit. Oliver was interested in coral reefs, and the researcher committed to developing a cross-curricular lesson and focused on soft skills. The focus remained to have an Oliver-centric project, thus expanding Oliver's knowledge base and skillsets. One commitment

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the researcher made to Oliver was that his imagination was the only limitation; in other words, anything goes. The researcher began locating the components necessary.

The researcher began project development with a piece of literature. Sometimes the books were lengthy, even series, and other times they were short. Shorter books provided for multiple literature pieces followed by audiovisuals and, of course, in-depth discussions. The researcher found coordinated videos on PBS (2019) to link one of the educational components of understanding the ecosystem and how humans and animals impact coral reefs. This project also stemmed from a rainforest project (Figure 6) recently completed by Oliver and the researcher. The rainforest project emphasized Murphy's (2016) position of allowing students to play and not interrupt their process. The rainforest project gave the researcher a new perspective of watching as the work progressed, grew, and unfolded across a screen. The more Oliver worked, the more the conversation grew regarding the rainforest. The researcher read to Oliver while he produced information (Figure 6). This casual format allowed for learner-driven discussions (Ritchhart et al., 2011; Vygotsky, 1978). The process of reading to him also allowed for his creativity not to be compromised.

Figure 6. The Rainforest Project



Oliver's interest in themes and requests for more knowledge also played a role in the project guidelines for developing a practical virtual project that translated well across a screen. The brainstorm reflection for the coral reef project began as follows:

Okay, follow me through my building/thought process. After our Rainforest and Arcade, I started thinking about the Coral Reef. I re-read a book I have at the house about the Coral Reef and thought this is something that would pique his interest and cover so many educational elements. I am also going to work on him creating a writing component.

This is literally a jumbo curated box about the Coral Reef to include: Lego City Ocean Exploration Submarine with Coral Reef, Lego Creator 3-in-1 Deep Sea Creatures, National Geographic Ultimate

Ocean Play Sand, Lego Classic Creative building kit (which we can use for a multitude of things....he can use it on his own just for fun too!!!), a display box, Creative Kid Flakes (that I will separate and send a certain number of pieces to build coral reefs), the Lego Block Base for the display box, and 2 Leveled National Geographic Books about the Coral Reef and Fish of the Coral Reef. I will loop in the scratch pad art kit (I have plenty at my house that I can add to his box) to build an original backdrop too.

This project will take several days for sure to complete. I think it would be easiest if I order all the components and put it together in an "Oliver Box" so that I make sure he has all the pieces.

The project commenced and finished in a one-session block via Zoom totaling 2.5 hours. Time was of utmost importance as students need time to "reflect, read, and respond without getting bored" (Ritchhart, Church, and Morrison, 2011, p. 81). The literature components of two short stories commenced the flow, followed by viewing a PBS (2019) program before the building and layouts began. Next, the researcher and Oliver reviewed construction materials, and he took the lead on the order of assembly and construction. During assembly, the researcher and Oliver found ample opportunity for chalk talk (Ritchhart et al., 2011). Chalk talk was instrumental for the researcher to draw on multiple assessment moments through conversation and knowledge base explanation versus a traditional paper or objective-based assessment (McLeod, 2012). Soft skills, such as confidence and motivation, were imperative in the long-term success of learning, and there seemed to be a lack of research that honed in on what made the learner feel successful beyond the measure of a test score.

When online, assessments during class are incredibly challenging. However, implementing chalk talk allows for LPP, legitimate peripheral participation, (Lave & Wenger, 1991), as evidenced by Oliver's contributions of soft skills and confidence in asking questions about the lessons. One of the things Oliver began doing was asking for the researcher to project images of coral reefs and fish of coral reefs so he could attempt to construct similar components for his version. The researcher learned to be quick to add any elements he needed to make his learning more fulfilled.

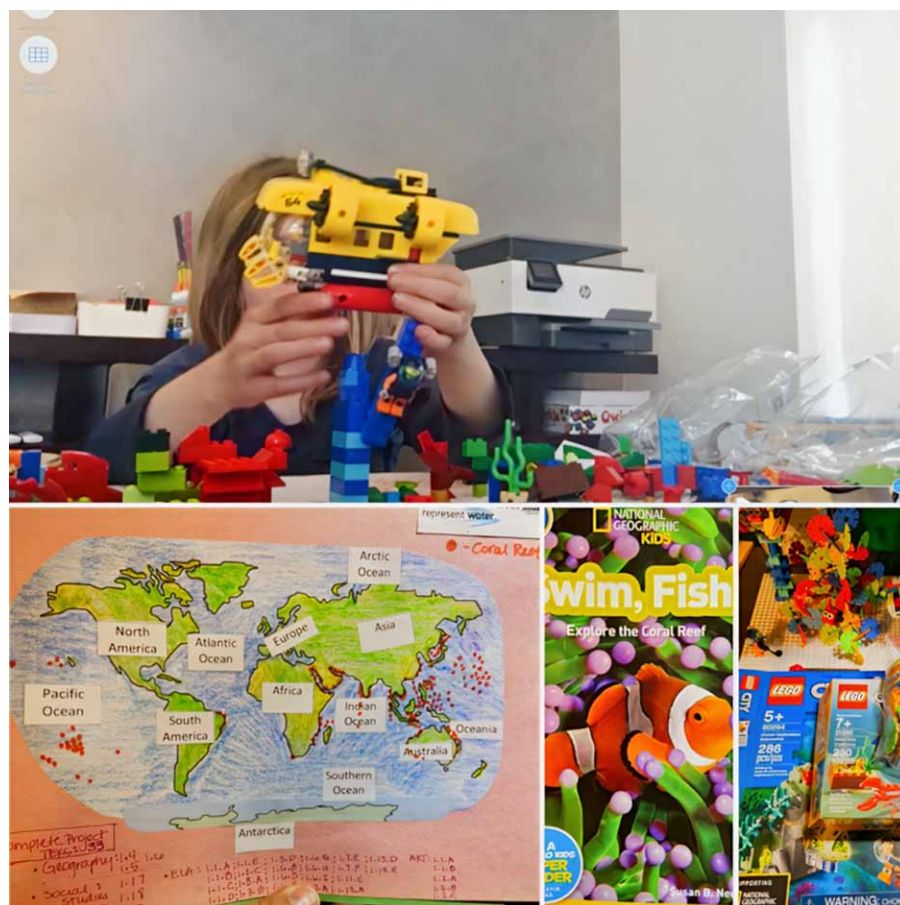
During construction, the LEGO® Creator 3in1 31088 Deep Sea Creatures set (2020) allowed Oliver and the researcher to create different animals using the same pieces. Oliver chose first, and then the researcher's choice was discussed and agreed upon, leaving Oliver with the final say of what he thought would add more excitement to their diverse creations. This level of negotiation was similar to a ZPD, zone of proximal development (Vygotsky, 1978), that would have occurred in a traditional classroom, or even with other peers online to include negotiation, discussion, and collaboration. Oliver's speed in construction exceeded that of the researcher, and he was quick to offer building tips and tricks that he referred to as his "lots of LEGO® building skills" and compassionately encouraged the researcher to "not give up... you'll get it!" This casual conversation transpiring between the two was comparable to ZPD in a classroom orientation. Oliver was completely immersed in learning and would take quick restroom breaks as needed. He never asked to stop, nor did he lose interest. Figure 6 provides a closer look at the project's construction and depicts some of the materials used.

During this project, the researcher scaffolded a prior social studies lesson on maps (see Figure 7) that covered a base 33 Texas Essential Knowledge and Skills (TEKS) (TEA, 2019). Oliver thoroughly enjoyed reusing previous knowledge of his maps to add the estimated location of coral reefs worldwide. While a project across a screen seems like a mess waiting to happen, a comfortable teacher will remain in control. However, the student has the authority of creativity, engagement, interest, and diversity in learning to complete the project. The researcher practices a personal rule of what they refer to as 'guide-

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lines, not tombstones,' meaning everything can and should be free to change (pivot) to find success. By the end of the coral reef project, the researcher learned that no matter how extensive or massive it may feel when detailing the parts, students will exceed and surprise the original expectations. If the student and the teacher have access to the same materials, the margin for error minimizes. Every project organically developed when the student remained at the center of the project. The critical takeaway from any project's development was that the teacher took the time to write and reflect on what worked, did not work, as well as the feelings about the teacher role in the project. This project is reproducible using less expensive items. For instance, students can use their backyards to locate rocks and foliage to paint to represent the coral reef. Students can use their toys, construction paper, plastic cups, straws, canvas and paints, magazine cutouts, or any item a student desires to transform. Students can work individually or in small groups and place their creativity on Google Slides or PowerPoint presentations. The opportunities indeed are limitless and can be cost-effective.

Figure 7. The Coral Reef Project



DISCUSSION

Teachers found themselves in a new world of online teaching and learning during the COVID-19 pandemic. Many schools and teachers have understandably relied more on pre-recorded videos, apps, and similar types of technology for online learning, especially during this unprecedented time. The human connection created and maintained via purposeful engagement and hands-on learning experiences during synchronous videoconferencing sessions is especially crucial for young learners in primary grades classrooms. *Crystallizing Moments* can occur naturally and indeed *humanly* during synchronous videoconferencing with face-to-face interaction and hands-on activities, enhancing engagement and making the most of online teaching and learning experiences. The 4Cs (communication, collaboration, critical thinking, and creativity) are crucial elements of twenty-first century teaching and learning. In the online primary grades classroom via synchronous teacher-student engagement, the 4Cs are best actualized in online primary grades classrooms via synchronous teacher-student engagement. The Reggio Emilia Lens provides insight into approaching engaging, hands-on, *Crystallizing Moments* and can be thoughtfully incorporated into online teaching and learning for young children. The case study of Oliver provided in this chapter offers a glimpse into how the 4Cs and the Reggio Emilia lens can work together within a child-centered teaching and learning environment involving ongoing and purposefully planned teacher-student interactions. Teachers of primary grades learners who are now increasingly teaching online can benefit from using a hands-on approach as was utilized with Oliver. Naturally, teachers have a variety of contexts, needs, goals, budgets, and realities. The general idea of planning synchronous primary grades teaching and learning sessions via videoconferencing, while using hands-on objects, in the actual hands of the child can be creatively applied with considerations of one's own teaching situation and reality. Teachers may consider how to scale up these interactions to include multiple students using their choice of available hands-on materials at home and then interacting with the teacher and other students via videoconferencing.

SUMMARY AND CONCLUSION

This small-scale research project served as an opportunity to observe using alternative methodologies and pedagogy in a time of much change and upheaval in education. While the research was a small-scale approach, the outcomes show promise for current and future classroom adaptations. The flexibility of experimentation with Zoom during the COVID-19 pandemic allowed for diversity in academic presentation. The researcher faced challenges of amplifying a more comprehensive range of academic skills than they had explored. On the other hand, the challenges provided validity to learning and filling in Oliver's gaps in the classroom. The collaboration between the researcher and Oliver promotes the pedagogical concepts of chalk talk (Ritchhart et al., 2011), ZPD and MKO (Vygotsky, 1978), and LPP (Lave & Wenger, 2015).

McLeod (2012) explains the Writing Across the Curriculum (WAC) movement born in the 1970s as a

recent educational movement, one aimed at transforming pedagogy at the college level, at moving away from the lecture model of teaching...to a model of active student engagement with the material and with the genres of the discipline through writing, not just in English classes but in all classes across the university. (p. 54)

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Student-centric engagement to learn, understand, and create learning should not wait until teachers face students in person. Equally, challenging educators and students to express themselves in real-time through virtual platforms is possible and productive. As a first-grade student, Oliver rose to the academic and participatory expectations through each project's course. The researcher focused on maintaining the role as an academic coach and facilitator, promoting Oliver's soft and hard skills. Knowledge acquisition in Oliver's academic growth (Figures 1 through 6) is notable. Oliver worried less and less about what to write and how to write it. The researcher maintained the principles of gradual advancement and expectation without limiting his potential through promoting active learning and critical thinking in every exercise and holding the position as a guide and peer support. During this approach, a student possesses the opportunity to revise work after submission after receiving feedback. Learning is scaffolded when students return to their work to fix and polish materials. Even as a first-grader, Oliver successfully made revisions after conversations with the teacher-researcher. Teachers of primary grades learners who are now increasingly teaching online can benefit from using a hands-on approach as described in this chapter. The approach can potentially be scaled up to include multiple students using hands-on materials at home and then interacting with the teacher and other students via videoconferencing.

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KEY TERMS AND DEFINITIONS

Creativity: A higher-order thinking skill involving humans/learners utilizing imaginative ideas and original approaches, typically involving synthesis, analysis, problem-solving, and often artistic thinking.

Developmentally Appropriate Practice: The use of instructional materials and strategies that honor the ongoing and specific phases of child development and learning during early childhood.

Differentiated Instruction: The practice of allowing many processes and products to demonstrate mastery of learning outcomes in education, understanding that learners approach tasks differently and learn in unique ways.

Hands-On Learning: A term used to describe students using their hands to create and represent their knowledge and not a software program.

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Legitimate Peripheral Participation: Understanding and learning takes place through participation and not within the individual's mind.

Online Learning: Instruction and learning occurring via the internet (either synchronous, asynchronous, or a combination of both).

Primary Grades: Grades K-3 in a United States school system.

Reggio Emilia: A teaching and pedagogy approach usually based on preschool and kindergarten students. The approach is a children-centric and constructivist self-guided curriculum, using self-directed, experiential learning in relationship-driven environments.

Twenty-First Century Learning: Skills recognized as necessary to navigation of and communication within the twenty-first century, such as communication, collaboration, critical thinking, and creativity.