A Study of the Impact of the Designed inGenuity (DiG) Learning Framework on Students in an Ethiopian School

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A STUDY OF THE IMPACT OF THE DESIGNED INGENUITY (DIG) LEARNING FRAMEWORK ON STUDENTS IN AN ETHIOPIAN SCHOOL

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ABSTRACT

A STUDY OF THE IMPACT OF THE DESIGNED INGENUITY (DIG) LEARNING FRAMEWORK ON STUDENTS IN AN ETHIOPIAN SCHOOL

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This is a convergent mixed-methods study that examines the impact of the Designed inGenuity (DiG) learning framework on ninth- and tenth-grade students in an international school in Ethiopia. Students completed pre- and post- Learner Identity Survey (LID) and mid and retro long-answer questionnaires. Educators were interviewed to gain context, hear their perspectives and acquire further insight. The impact of the experience was found to have the most change to Learner Identity in terms of vulnerability, disposition and creativity. This research can help parents, educators, and community members seeking to understand the impact of the DiG learning framework on educators and students in the context of an international school.

Keywords: personalized, transformative, learning, learner identity, vulnerability, disposition, creativity

Dedication

This work and all the work that I am doing is dedicated to my nephew, Jayan Tanna.

When you came into the world, you brought with you love, light and laughter.

All that I do is so that you might live in a world of peace, kindness and love.

Acknowledgments

Co-creating a harmonious world in which all living systems can flourish.

I am grateful to say that I am not walking on this path of transformation alone.
My parents, Ghanshyam and Madhu Tanna, thank you for your unwavering support, your ability to comfort me during the struggles and your unconditional love.
Thank you to my brother and sister-in-law, Dipen and Sheena Tanna, for who you are and for bringing the light that is Jayan Tanna into the world.
A special thank you to my partner, Nick Salmon, for holding my hand as we co-create a world in which all of us can flourish.

There are so many of you that have contributed to this learning journey.
Thank you to Thompson Morrison for bringing all of your insights to me. Your superpower as a storyteller means that we have the DiG, we have deep understanding about how we learn and we continue to show up as curious, courageous and connected learners.
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CHAPTER I: INTRODUCTION

"I don't like the fact that [school] is 7+ hours a day and takes about 12+ years to complete, only to receive more work at home. After Grade (sic) 12 you then go on to do 4 years + of more school only for you to receive a piece of paper that helps you to get an average wage 9–5 job. You then finish work, retire, then die and regret your life."

A ninth/ tenth grade student

This is not OK. It is not acceptable to me that a young person who, by today's standards, would be expected to live for another sixty years at least, has such a despairing view of life. Victor Frankl (1946), in his book Man's Search for Meaning, defines despair as suffering without meaning. In this simple summary statement about life, this young person is describing the essence of what I understand to be the root cause of the widely reported mental health issues for teenagers (WHO, 2021), various TikTok challenges to destroy schools (Klein, 2022) and the high levels of stress experienced by those working in education (Agyapong et al., 2022). There is a sense that there is much suffering, little learning and no meaning-making within school communities (Walsh, 2020).

The statement was made by a student at the international school where the following study was conducted prior to launching the Designed inGenuity (DiG) learning framework. The students were asked, "What do you love about school?" and then, "What do you dislike about school?" These two questions provoked much animated discussion; revealing to the students and educators in the room the importance of relationships, the clarity of the students' opinions and, for some educators, it caused a great deal of discomfort.

When the students were subsequently asked, “If you could design a school, what would you want to happen?,” most students focused on what they did not want–for example, uniforms, early starts and being told what to do all the time. This was a surprise to most adults in the room who had envisioned students sharing vivid images of how they would want their learning spaces to look, sound and feel, with a focus on particular subjects and more access to the outside world. Instead, the students’ responses demonstrated apathy, inertia and hopelessness; they did not believe anything would change even if they shared their ideas with the adults. These young people clearly expressed that they feel like they have no choice in how they live their lives, especially within the school setting. The lack of imagination for what might be possible in designing their own learning journeys and lives affirmed the need for change.

During this five-year journey of a Master’s degree in Transformative Learning Communities, I have explored the meaning of these three concepts, experienced transformation within myself, observed the transformation of others and participated in learning within my community. Also during this time, I was introduced to the DiG learning framework. Since experiencing the transformative experience of a DiG learning journey with others, I have wondered how it might impact young people around the world. I believe that it is the responsibility of adults in schools to first transform themselves in order to create the conditions for young people to experience transformation. This is, after all, the aspiration of learning; that we are transformed because we have made meaning from the experiences in our lives.

My Own Story

> Everything can be taken from a man but one thing: the last of the human freedoms—to choose one's attitude in any given set of circumstances, to choose one's own way.
>
> –Victor Frankl, Man's Search for Meaning (1992, p. 3)

As an unseen young artist, who loved to create beauty through words, letters and still life sketches, I often wonder what my life might be like today if any of my teachers had asked me what I loved to see, do, or think about, how I was making meaning of these observations, experiences and ideas and what I was passionate about creating in the world. The young artist makes an appearance every now and then and in those moments there is a feeling that, perhaps, a gift has been denied to the world. I do not want anyone else to feel that they were not able to choose their own way. I want to live in a world where all of our natural talents are guided towards the fulfillment of our innate potential and we are able to purposefully contribute to a flourishing world.

Globally, school systems are oppressive and based on a philosophy of conformity, compliance and control. This statement is well documented and most famously described by the late Sir Ken Robinson in many of his talks, books and discussions about how schools kill creativity (Robinson, 2006). Reflecting on my own experiences after primary school, I agree with Sir Robinson's assessment. I was expected to conform by following a straight line from school to college and then to university, and although I recognize the privilege of being born into a safe and loving family, this experience was not what I would have chosen for myself. After complying with the "game of school," I discovered ways to learn with young people without the

control of school through volunteering and mentoring opportunities. After a career in retail banking, I was invited to return to school as an educator. However, it quickly became clear to me that the education system was still limiting young people's creative potential.

The education that we receive in schools is creating the society that we live in and therefore it is essential that we have open discussions about the beliefs, theory and practices of school. I believe that each human being is born with an infinite capacity to learn and to deepen their thinking and that by learning with intention, we can transform ourselves, others and the world we are co-creating. Currently, I am working as a Global Education Coach with a mission of transforming education towards purpose-driven learning using the DiG learning framework. My focus has been on the education system around the world, including state schools, charter schools, private schools, faith-based schools, urban and rural schools, online learning platforms and other learning environments.

The guiding intention of the DiG learning framework is to "awaken wonder" so that empowered creative learners might become creative problem solvers. Since experiencing the DiG, I have observed a transformation within myself; my learner identity has improved. My confidence with learning, sharing my learning and supporting others to learn has increased. I recognize myself as a lifelong learner who is curious, courageous and able to make meaningful connections with concepts, ideas and others. Through the experience of a DiG, I feel empowered to seek and create solutions to situations that we all face in our daily lives. I am curious about the impact of the DiG on others.

Who I Am in This Inquiry

In this inquiry I am a researcher, facilitator and coach. I am curious about the possibility of reimagining education as an opportunity for us all to be deeply reconnected to what it means to be human. We need a deeper understanding of the purpose of learning and its transformative effects on humans of all ages in order to co-create a world in which we can all flourish.

The current education system accepts the mediocrity of information gathering, knowledge-making and assessment of a final product. However, what is needed are learning environments intentionally curated for powerful learning experiences, opportunities for making meaning of those experiences and then purpose-driven learning that leads to the transformation of the individual, the community and the planet. Our young people are repeatedly demanding that we must change how we show up for them. I work to inspire educators, through modeling, facilitating and coaching, to move toward a new way of being.

Philosophically and practically, I am guiding adults and young people to view themselves as co-learners; encouraging them to remain curious and to courageously respond to changing realities with resilience, through experimentation and feedback. A fundamental part of the human condition is to be constantly learning and with global interest in the impact of the DiG on educators and students, this study is the first to formally research the neuroscience base of the work and the potential impact on learner identity.

A Note on Language

The language used in this thesis is placed in the context of a British-born citizen using American spelling to be consistent with the American spelling of the international school in Ethiopia and the university assessing the thesis.

The language used in this thesis is reflective of my preference of referring to teachers as educators. The root of the two words is different and implies different attitudes, behaviors and notions of learning. The word “teach” has the root “to show,” which implies that the student plays a passive role in the relationship (Harper). The word “educator,” on the other hand, is drawn from the root word “educare”; “to draw out” (Harper). This implies that the educator is intentionally creating the conditions for the learner to share what is already inside of them, as it relates to the new information given. The educator is engaged in a systemic feedback loop in which they can learn from the student as they share their insights. This is a mutually beneficial relationship. The word student is used as it is a more familiar concept than ‘young learner.’

Motivations for Undertaking This Study

“I would like school to teach us things we will actually use in our life.”

A ninth/ tenth grade student

This study of the impact of the DiG learning framework on a Personalized Learning Experience (PLEx) program was inspired by the desire of the Lead Facilitator to create the possibility for deeper learning. She had joined the international school in Ethiopia in the 2022-2023 academic year and was assigned to organize, lead and facilitate PLEx; a legacy project from a previous head of school. PLEx is a four-week, off-regular schedule

and end-of-school-year program for ninth and tenth grade students. The school wanted to determine if they would continue arranging this experience at the end of the school year or move to integrating a PLEx culture throughout the school year.

In a desire to create a more personalized experience, the Lead Facilitator gathered a small committee of students to discuss what PLEx 2023 might look like, sound like and feel like. They provided input on the schedule for the four weeks including organizing physical activities and weekly breakfast gatherings. They suggested that students could be asked to share initial ideas of what they would like to produce at the end of the four weeks. As this information from the students was received, the Lead Facilitator began to wonder about the depth of the learning. Would the students have a transformative experience in which they make personal meaning and find a collective purpose?

The PLEx Lead Facilitator wanted to see students demonstrate a deeper understanding of the purpose of their project and who their project could impact. She wanted the experience to inspire them to become lifelong learners who are passionate about transforming the world. She wanted them to experience a transformative learning experience within their school and local community. Knowing that Transformative Learning Communities is the name of my Master of Arts in Social Sciences specialization, she asked if I could support her to undertake the work of organizing, leading and facilitating the work. Our discussions led us to realize she was looking to improve the students' learner identity and this was an opportunity to research the impact of the DiG learning framework on students.

We met with the high school principal to discuss how this might be done. It was agreed that I would first lead eight educators, plus the principal and assistant principal, through an online personal learning journey using the DiG learning framework. Then I would come to Ethiopia for one week to launch the experience with the students using the DiG learning framework. Finally, I would provide online support to the Lead Facilitator for the following three weeks as she and the other educators continued to facilitate and guide the students towards a transformative learning experience within their community.

Research Question and Purpose Statement

The research question for this study is, “What is the impact of the Designed inGenuity (DiG) learning framework on ninth and tenth grade students’ learner identity in an international school in Ethiopia?”

The DiG process guides students through a process of creating personal meaning when learning about their own interests. The DiG learning framework has not yet been formally studied in academic research and as such, this study is a foundational piece of research for using the framework in schools around the world.

Learner identity is defined as “a fluid, organic construct which aspires to embrace the process of becoming a learner rather than measuring what learners become” (Parkinson et al., 2021, p 76). These concepts are described and defined in more detail in the literature review.

The purpose of this study is to analyze and evaluate the self-assessment data from the ninth and tenth grade students in order to determine how they view themselves

as learners before and after experiencing the DiG. This study explores the impact of the DiG as a personalized and transformative learning experience within a school community on the learner identity of students. In the next chapter, the following terms will be explored and defined through a literature review:

- Personalized learning
- Transformative learning
- Designed inGenuity (DiG) learning framework
- Active inference
- Learner identity

CHAPTER II: LITERATURE REVIEW

This study is to understand the impact of the DiG on students' learner identity in an international school in Ethiopia. The general field of this study is transformative learning within communities. There has been much interest in the impact of transformative learning (Mezirow, 1991) and personalized learning (Walkington & Bernacki, 2020) within recent years. This literature review will describe and define these concepts. In addition, this review will share the major developments in neuroscience research with the advancement of technology, particularly fMRIs (Ogawa, 1990). It will define and describe the three main tenets of the DiG learning framework: curiosity, courage and connection. Finally, it will discuss the concept of learner identity (Kolb & Kolb, 2009) with a short review of each of the characteristics measured by the Learner Identity (LID) survey.

Personalized Learning

> Education doesn't need to be reformed—it needs to be transformed. The key is not to standardize education, but to personalize it, to build achievement on discovering the talents of each child, to put students in an environment where they want to learn and where they can naturally discover their true passions. (Robinson & Aronica, 2009, p. 238)

The current thinking about the definition of personalized learning (PL) is that there is no one definition. Rather it is often described as a reference to practices that tailor the pace and focus of instruction to address the needs and goals of each student. (Pane et al., 2017). The U.S. Department of Education, writing in the context of the impact of technology on learning in schools, make it clear that PL means understanding the needs of each individual learner and varying all elements of the learning to their needs:

> Personalized learning refers to instruction in which the pace of learning and the instructional approach are optimized for the needs of each learner…. In addition, learning activities are meaningful and relevant to learners, driven by their interests, and often self-initiated. (2017, p. 9)

In this information age, it has been identified that the availability of highly customized information allows people to tailor their exposure to the amount and type of information by their own preferences (Liang et al., 2006). In the same way, to avoid information overload for learners, educators can create space for students to personalize their learning. Many studies on personalized learning have been curious about the effects of using advanced technologies to personalize student learning (Arroyo et al., 2014; Chen, 2008; Robinson & Sebba, 2010). However, “While positive effects of technology-supported personalized learning approaches on educational outcomes have been often proposed from a theoretical perspective, empirical evidence is still in its infancy” (Schmid et al., 2022, p. 189). Lee et al. (2018) argue that to personalize instruction and to document the individual learning progress, technology is essential.

The research on personalized learning consistently refers to the process as students setting their own goals and path. The Aurora Institute, a non-profit organization whose mission is to drive the transformation of education systems, explains, “In a personalized learning environment, learners have agency to set their own goals for learning, create a reflective process during their journey to attain those goals, and be flexible enough to take their learning outside the confines of the traditional classroom.” (Patrick et al., 2013, p. 4). Bray and McClaskey (2014), international speakers on personalized learning, explain that in PL, “learners have a choice in how they

demonstrate what they know and provide evidence of their learning. In a learner-centered environment, learners own and co-design their learning. The teacher is their guide on their personal journey" (p. 5). This point also highlights the importance of the students determining their own style of presentation to share their learning journey.

The role of the educator is emphasized in much of the literature. Dougherty (2021) explains, "Building student ownership of learning requires positive relationships with students. Teachers who know and care about their students as individuals are best able to personalize learning that builds ownership of learning" (para. 5). However, according to Shemshack and Spector (2020):

> It seems the personalized learning models gain more attention from governments and policymakers than educators and researchers. We need to focus on the obstacles of lack of interest to motivate the educators and researchers, the experts of the field, to voice their concerns and look for solutions to come up with a robust model that will satisfy both instructor and learners' expectations. (p. 16)

The impact of personalized learning on students' learning outcomes has had mixed results (Walkington & Bernacki, 2020). Schmid et al. (2022) share that two meta-analyses studies showed that student-centered approaches are associated with an increase in cognitive and emotional-social aspects of learning in comparison to traditional approaches (Cornelius-White, 2007; Freeman et al., 2014). A study of eighth-grade students in Ohio revealed the impact of PL on student enjoyment: "When using a student-driven, connected approach, students stated that they enjoyed the connectedness of their learning–across disciplines, through technology, and through relationships with each other and their teachers" (Porath & Hagerman, 2021, p. 36). However, the evidence of the impact of PL is currently inconclusive and inconsistent, in line with the lack of a widely accepted definition of personalized learning.

Transformative Learning

The aspiration of the DiG is to co-create the conditions for transformative learning with an emphasis on connecting the abstract concepts in many curricula to the learner's lived experiences and own curiosities leading to personal meaning. Rooted in the work of Jack Mezirow, transformative learning (TL) is a comprehensive educational theory that explores the process through which individuals undergo significant shifts in their perspectives, beliefs, and identities. It is grounded in constructivist and critical theory perspectives (Mezirow, 1991). His theory highlights the importance of reflection, critical discourse, and a disorienting dilemma as catalysts for transformative learning (Cranton, 2006).

Mezirow (1994) has defined transformative learning as "an orientation which holds that the way learners interpret and reinterpret their sense experience is central to making meaning and hence learning" (p. 222). Although his research is grounded in adult education and learning, recognizing adults' life experiences as valuable learning resources, it is possible to apply his understanding to young people's learning experiences. He originally proposed a ten-phase process, including a disorienting dilemma, self-examination, critical assessment, and the acquisition of new perspectives. However, later scholars refined these stages, emphasizing the cyclical and recursive nature of transformative learning (Taylor, 2007). Transformative learning is increasingly recognized in higher education as having the impact of fostering critical thinking, social awareness, and personal development (Kitchenham, 2008).

Transformative learning is often facilitated through reflective practices, encouraging individuals to question assumptions and consider alternative viewpoints

(Cranton, 2006). The process of a dialogical interaction in which people are engaging in meaningful discourse with others, especially those with diverse perspectives, enhances the transformative learning process (Mezirow, 2000). However, individuals may resist transformative learning due to a discomfort with challenging their existing beliefs (Mezirow, 1991). In addition, institutional barriers, such as scheduling and education policies may pose challenges to the implementation of transformative learning approaches (Taylor, 2017).

Transformative learning is closely linked to social justice, encouraging individuals to critically examine social issues and work toward positive change (Cranton, 2006). Integrating social justice principles into transformative learning practices enhances its impact on societal transformation (Dirkx, 2012). Studies by Gregorčič and Jelenc Krašovec (2017) and Gregorčič (2019) have even explored the impact of TL on politics and economics in society.

As with PL, the impact of technology on TL is still being researched. Professor Emeritus of Lifelong Learning and Adult Education at Penn State University, Dr Taylor (2017) states that digital platforms and online learning environments can provide opportunities for transformative learning experiences. The possibility of global collaboration and diverse perspectives through technology-mediated dialogues and reflective blogging are examples of how online spaces can facilitate transformative learning (Rodgers, 2002). As technology continues to shape learning environments, there are further opportunities to foster transformative learning experiences, promoting critical consciousness, and societal change.

Although Mezirow's research began in adult learning, TL has its roots in critical and constructivist theories and evolved into a multifaceted educational approach applicable across various contexts. Understanding the challenges and opportunities associated with TL is essential for educators and researchers aiming to harness its potential for personal and societal transformation. The DiG holds the possibility of a transformative learning experience for all participants.

How We Learn

One of the leading models of how we learn is based on the groundbreaking work of Karl Friston, an important contributor in the development of modern neuroscience. It was with his algorithms of statistical parametric mapping that we began to unlock the potential of using functional magnetic resonance imaging (fMRIs) to see the mind in the act of thinking. This ability has completely transformed how we understand the brain – leading to a deeper appreciation of the whole mind; "a whole-brain network associated with high-creative ability comprised of cortical hubs within default, salience, and executive systems" (Beaty et al., 2018, p. 1087).

Friston et al. (2017) developed a process theory called "active inference" to explain how all living things learn. At the core of this theory was his concept of the "free energy principle" or the "normalizing force." Using the example of physics: assuming that particles naturally exist in a chaotic state, leads to the existence of a normalizing force that creates some order. Likewise from Friston's process theory, we understand that biological systems have their own systems, their own normalizing force, to maintain order. They do this by restricting themselves to a limited number of states which entail beliefs about hidden states in their environment.

At the core of Friston's work is something called Bayesian inference, in which Bayes' rule, a statistical formula, is applied. This statistical method is focused on how one might best predict future experiences based on current knowledge. According to Bayes' rule, the optimal way of using this information is to calculate the information's likelihood under various models of the environment, and to weight this likelihood by the strength of prior belief in each model to derive posterior beliefs. In recent years, the influential hypothesis has been advanced that Bayesian inference represents a unifying principle of neural computation (the Bayesian brain hypothesis; Knill and Pouget, 2004, as cited in Bennett, 2015).

In simple terms, learning begins with an assumption. We assume that the world is organized based on our previous experiences. This assumption allows us to act, because we assume that the consequences of that action will be predictable. The problem is that the world is far more complex than the mental model we will ever have of it. In turn, not all actions result in consequences that we have predicted. A central function of the nervous system is to use sensory information to infer the causal structure of the external world. When there is an unexpected experience, a "surprise," order is disrupted and must be quickly restored. That experience of surprise is essential for our learning as it forces us to update our understanding of the world. To reestablish order, small, continuous experiments are used, something Friston calls "epistemic foraging," until there is a moment that a new understanding, a new order, is established, what Friston calls a "Bayesian belief update." These updates are informed by beliefs about the future (prediction) and context learning that is informed by beliefs about the past (postdiction) (Friston et al., 2017).

Making this connection between what we thought we knew and what the new experience teaches us is the essence of lifelong learning. This theory closely aligns with Piaget's theories of learning, specifically the concept of "schematic accommodation." Piaget's philosophy of education, "constructivism," surmised that learners gradually build an increasing understanding of the world through the experience of learning (cited in Luvmour, 2006). This experience either added to their existing model of how the world worked, which he called their "cognitive model," or caused them to restructure that model to create a new understanding. With this new understanding, we remain curious and courageously venture back out into the world. Only to be surprised again. Only to learn again. A lifelong process of learning that allows us to grow. A process that helps us gain new meaning that gives our life a purpose larger than ourselves (Morrison).

Designed inGenuity Learning Framework (DiG)

The DiG is a learning framework for the creative mind. It is an approach that emerged from a partnership between a software industry consultant, Thompson Morrison, and Jami Fluke, a principal of a school in Dayton, Oregon. This partnership was inspired by the work of a seventh-grade classroom teacher named Jenni Shilhanek. Having been granted the permission to experiment from Jami, Jenni developed what was then called the Dayton Practice: fast, iterative learning cycles that help students find personal meaning in a way that exponentially accelerates the rate of their learning (Turner).

The DiG framework takes participants through a process of personalized learning with a DiG guide carefully guiding the group toward a transformative learning experience. The intention is to create an ambience of curiosity within the group; to

awaken, or reawaken, wonder in the participants about the world around them and to make meaningful connections between new information and prior understanding.

Each DiG begins by determining a common ground, a place of convergence for the “learning pod.” The base, a two-word phrase that all participants connect with their learning, is pre-determined by the DiG guide. An example of a base is Empowered Genius. Each learner is then commissioned to embark on a journey that is divergent in nature. This is determined by the spin of the wheel to receive a “scrambler” word, and an invitation to connect the research to the learner’s own interests and curiosities. The scramblers are concepts that can include well-established subject disciplines (science, history, etc); defined concepts from the curriculum (for example, protection, freedom); as well as abstract concepts (for example, twenty-first century skills of curiosity and creativity). The learners gather at regular intervals to share their learning journey, connecting the two-word base and scrambler with their own interests and curiosities, with their “Learning Pod.” This learning trivium of a base, a scrambler and the learner’s own curiosities and interests creates the potential for deep insight into their understandings of themselves, each other and the world. At the end of the learning sprint, their discoveries are brought back to the group in a “Demo Day,” where the pod members learn from each other and a new convergence of shared understanding is created. The Learning Pod returns to reflect on this shared understanding and the process as a whole, moving from a Learning Pod to a “Creative Pod,” and the learning process begins anew.

A key element of the DiG is the ritual of creating a brave and safe space together (convergence), individually exploring, discovering and making meaning (divergence)

and then reconnecting with each other to deeply listen to each other's stories of learning. The DiG structure and routines provide a safe space for participants to share their learning with each other. This journey of exploration and discovery, guided by a curious deep listener asking simple questions about surprises and feelings, leads to personal insights and collective stories that make meaning of the learning experience.

The DiG process is based on the Agile framework; a structured set of practices, principles, and guidelines that organizations use to implement and apply Agile principles in their software development projects. The Agile method of learning is one in which a clear intention is defined, deciphered and then acted upon in fast, iterative learning cycles (López-Alcarria, 2019). In this model, not only are both convergent and divergent thinking embraced, but also passive and active learning. This emergent pedagogy might be termed integrated learning–where thinking and learning are linked with curriculum and experiences in order to achieve rich and deep learning that unleashes the creative genius of students.

There is a rhythm of learning that can be developed when DiGs are incorporated into conventional curriculum-based learning. In these classroom environments, direct instruction can be used to help establish a shared knowledge base, a "scaffolding," for the learning which then leads into a DiG adventure where that knowledge is made alive and meaningful for students through their curiosity and creativity. This meaning increases student engagement and agency.

The DiG framework complements how digital natives, who are the students in our schools, are thinking differently from previous generations. While traditional education

practices focus on the product (a report or an exam), the learning cycles of the DiG framework center on process. This approach recognizes that when the intention of learning has been defined, the product, a “creative artifact,” will emerge–and often it will both surprise and surpass expectations. The incorporation of both the divergent thinking required to “empathize” and “ideate” and the convergent thinking that precedes bringing the process to the creation of a product is one of the most powerful aspects of a DiG. It adds to the DiG being a more “human-centered” process that enables learner agency through its focus on personal meaning-making through the lens of the learner’s own interests.

Since learning about the DiG, the researcher has observed Morrison take many educators through the process and participated in the DiG themselves. Educators often share their surprise at the depth of insights that emerge when following their own curiosities. They also share surprise at their courage to share the insights with their colleagues, even those with whom they had a loose connection. Often, educators shared that they felt intimately connected to their peers and with the new learning about random, seemingly disconnected concepts in their stories at the end of the DiG. These observations led to the insight that the core tenets of the DiG are curiosity, courage and connection.

Tenet 1: Curiosity

Curiosity, one of the key tenets of the DiG framework, is the first step toward new learning. There are many definitions of curiosity; a recent neuroscience study defined it this way: “Curiosity is an internally motivated search for information.” The same study

adds that curiosity “is enduring and open-ended, and may have evolved to help us build accurate mental representations of our ever-changing environments” (Patankar et al., 2023, p. 2). Curiosity is identified as a “motivator for learning, influential in decision-making, and crucial for healthy development” (Kidd & Hayden, 2015, p. 1). It is something that has been studied by psychologists and neuroscientists for over one hundred years.

Curiosity is considered to be “critical for academic performance” (Association for Psychological Science, 2011). Generally defined as a desire to learn or know about something, it is considered the first step toward learning in this study of the impact of the DiG. The DiG is a response to many scholars’ calls to schools and universities, which “must early on encourage intellectual hunger and not exclusively reward the acquiescent application of intelligence and effort” (Charlton, 2009, quoted in in Stumm et al., 2011, p. 582).

Engel reminds us that we are naturally curious in the title of her book, The Hungry Mind: The Origins of Curiosity in Childhood (2015). She argues that curiosity is intrinsic to children's development and that the educator has an important role to play in cultivating curiosity. Engel also reminds us that, “Novelty is not everything…. Sometimes children are most eager to learn about something with which they are already familiar” (2011, p. 627). Her article, “The Case for Curiosity” (Engel, 2013), shares four ways in which educators can support their students to become more curious and satisfy their hungry minds.

Other definitions of curiosity include Piaget's definition, "the urge to explain the unexpected" (cited in Whitehouse et al, 2018). This resonates with the work of Friston explained above (in the How We Learn Section, page 26). Additionally, Kagan (cited in Whitehouse et al, 2018) described curiosity as the "need to resolve uncertainty" further reinforcing the reason for the importance of opening up space for curiosity in learning (p. 5). In agreement, Engel (cited in Whitehouse et al., 2018) states, "When children are curious, they learn. It turns out that curiosity in school is not merely a nicety but a necessity." (p. 6)

However, Whitehouse et al (2018) ask the essential question, "Teachers may start their careers as professionals who develop, hone and instil skills such as awe, wonder and curiosity but how easy is this to maintain in a constantly shifting climate of change?" (p. 3). They emphasize the importance of educators showing up as curious learners with their students. They state, "Curiosity then is perhaps something that needs to be taught, encouraged and developed, in teachers as well as in the children they teach" (p. 3).

Tenet 2: Courage

Although there is a recognition of the need for courage in classrooms, it has not yet been widely studied and has no one clear definition (Martin, 2011). In their book, Character Strengths and Virtues, Peterson and Seligman (2004) name courage as one of the strengths of character. It is considered to be a foundational, cross-cultural human virtue associated with key character strengths like bravery, persistence, and integrity. This tenet of the DiG is associated with confidence, vulnerability and resilience.

In the title of his book, The Courage to Teach, Parker Palmer (2017) reminds us of the origin of the word from the French “coeur” for heart. The book details what it means to have the heart of an educator: “good teaching cannot be reduced to good technique; good teaching comes from the identity and integrity of the teacher” (p. 10). Palmer explains that it is essential for the educator to be brave enough to explore their own sense of self, be willing to vulnerably share themselves with their students and be adaptable in their practice.

Brené Brown (2018), widely recognized as one of the most influential researchers of vulnerability, explains that “we must find the courage to get curious and possibly surface emotions and emotional experiences” (p. 67). She shares the importance of parents and educators being vulnerable and brave, particularly because they are often the leaders in the relationship. The theme of knowing oneself is reinforced in her work as she calls on everyone to have the confidence to accept the challenge of being vulnerable with others and face the consequences of doing so.

Tenet 3: Connection

> When we attune with others we allow our own internal state to shift, to come to resonate with the inner world of another. This resonance is at the heart of the important sense of “feeling felt” that emerges in close relationships. Children need attunement to feel secure and to develop well, and throughout our lives we need attunement to feel close and connected. (Siegel, 2010, p. 27)

The assertion that connection is an essential part of the human condition is reiterated by many. “Love and belonging might seem like a convenience we can live without, but our biology is built to thirst for connection because it is linked to our most basic survival needs” (Lieberman, 2015, p. 43). In order to survive, humans must be connected.

Research on the value of connection in learning covers a broad range of perspectives on the student-educator relationship (Luvmour, 2006, 2010, 2011), the transformative value of learning within a community (Bandura, 1977) and between abstract concepts in transdisciplinary learning (Siemens, 2004). The development of a positive learner identity (discussed further below) can be influenced by the learner-instructor connection, “integrating meaningful dialogue with children throughout daily activity is a great way to encourage a positive learner identity in the children we work with.” (Hood, 2023a, para. 8).

Inevitably, technology has influenced the discussion and the concept of networked learning has been defined as “learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources” (Goodyear et al., 2005, p. 453). The learner-learner connection is important because “when people feel part of a group, they are motivated to establish a shared set of values and beliefs, and to coordinate their behaviour to promote the interests of the group” (Bunce, 2021, para. 2).

Connectivism as a learning theory has been the subject of much discussion (Kop & Hill, 2008). It is described as “the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual” (Siemens, 2005, p. 8). This research refers to the connection of concepts in a complex world.

The term “connected learning,” coined by Ito et al. (2012) “advocates for broadened access to learning that is socially embedded, interest-driven, and oriented toward educational, economic, or political opportunity” (p. 4). This theory of learning is connected to the concept of personalized learning in which the individual’s journey is supported by the community in order for the learner to become a valuable contributor to the community.

These concepts represent the three tenets of the DiG and the three domains of the Learner Identity (LID) survey. Learner identity is discussed below, along with the nine characteristics identified in the survey.

Learner Identity

The concept of learner identity is closely connected to narrative identity, “a person’s internalized and evolving life story, integrating the reconstructed past and imagined future to provide life with some degree of unity and purpose” (McAdams & McLean, 2013, p. 187). According to Kolb and Kolb (2009), a learning identity lies at the heart of the “learning way,” a concept coined as part of their studies of experiential learning experiences. They go on to explain that people with a “learning identity,” “see themselves as learners, seek and engage life experiences with a learning attitude, and believe in their ability to learn” (Kolb & Kolb, 2009, p. 5).

Learner identity is a dynamic aspect of an individual’s self-concept as a learner; diverse learning experiences are integrated into this cohesive story of personal growth and evolution. As a self-perception and understanding that develops over time, it encompasses the beliefs, attitudes, values, and experiences related to the process of

acquiring knowledge and skills. Developing a learner identity involves recognizing one's strengths, preferences, challenges, and the strategies employed in the pursuit of learning. This identity can evolve over time based on educational experiences, feedback, and personal reflections.

In considering the formation of learner identity, educational experiences significantly contribute to the way that individuals interpret their learning journey, including successes, failures, and transformative moments. The learner identity also impacts how the experience becomes part of their broader life story. Positive and challenging learning experiences shape the narrative individuals tell themselves about who they are as learners. The development of a learner identity involves reflecting on personal values related to learning, such as the importance of curiosity, resilience, collaboration, or creativity. These values become integral elements of the narrative that individuals construct about their identities.

Learner identity serves as a foundational element that underpins the whole narrative identity–influencing how individuals perceive their past, present, and future in the context of their learning experiences. The stories we tell ourselves about our learning journey contribute to a broader narrative that shapes our sense of self and purpose. Therefore, a survey to measure the values and skills of being a learner was created to support the students to self-assess the impact of the DiG on their learning during this study.

Learner Identity Defined by LID Survey

For this thesis, learner identity is assessed by the LID survey originally co-created by Thompson Morrison, a software industry consultant, and Jessica Lewis, an educator in an inquiry-based school in Australia. Based upon the core tenets of the DiG, the three domains of the survey are curiosity, courage and connection. Within each domain, three characteristics are defined and respondents are asked to self-assess on a Likert-scale from 1 (strongly disagree) to 5 (strongly agree). The LID survey was shared with the students before and after the four-week experience with the DiG.

The questions asked in the pre- and post-surveys (Appendix A) and mid- and retro-questionnaires (Appendices B and C) are based on neuroscience and academic research that show that having a "learning identity" has an impact on the capacity of people to "trust their direct personal experiences and their ability to learn from them" (Kolb & Kolb, 2009 p. 6). The DiG recognizes that "learning changes the brain by forming new connections and that students are in charge of this process" (Blackwell et al., 2007, p. 254). The researcher is curious about how the DiG impacts the development of this self-belief in the capacity to learn. Each domain and characteristic used in the LID survey is explained below.

Curiosity

Having a disposition of curiosity is important because it means learners can explore new ideas from a place of awe and wonder about the world; they can ask questions, and seek answers.

Disposition. A tentative definition of disposition is “a tendency to exhibit frequently, consciously, and voluntarily a pattern of behavior that is directed to a broad goal,” (Katz, 1993, p. 2). A learning disposition refers to the way in which learners engage in and relate to the learning process. It is sometimes called “habits of mind” or “dispositions to learning,” and is important because it affects how students approach learning and therefore the outcomes of their learning. Adopting the disposition of a “growth mindset” (Dweck, 2008) by overcoming obstacles, embracing successes, and navigating the complexities of learning contributes to the narrative of one’s identity. Hedges (2021) stated that “dispositions assisted development of learning and early career identities” (p. 189). For example, some desirable learning dispositions include resourcefulness, curiosity, and persistence. In summary, learning dispositions are important for building one’s learner identity because they affect how learners approach learning and therefore the outcomes of their learning.

Awe. The experience of awe can be described as an “epistemic emotion” that can inspire learning within the student and has been defined as “an emotional response to perceptually vast stimuli that overwhelm current mental structures, yet facilitate attempts at accommodation” (Shiota et al., 2007, p. 944). This can lead to a greater sense of life purpose. This is connected to Piaget's schema (discussed on page 27) and the extended by Jones et al. (2002), “In science education, awe has the potential to motivate explanation-seeking, promote conceptual change, and instill feelings of connectedness to the natural world” (p. 2485).

Wonder. Wonder is often thought to be related to awe. The Greater Good Science Center at UC Berkeley (2018) shared that wonder is “the response to something

incomprehensible, incredible but not frightening, a rarely felt emotion" (Ekman & Cordaro, 2011, p. 365). An article titled, "Wonder and Learning" shares that "Socrates said, 'Philosophy begins with wonder.' Philosophy begins with the act of marveling and questioning" (cited in McEwan, 2008, p. 109). Philosophy, or making sense of the world, is an important part of learning (Darbor et al., 2016). Hadzigeorgiou (2020) shared, "wonder can be an important teaching/learning tool, which can foster both emotional and cognitive engagement with subject matter, regardless of the discipline (e.g., history, science, geography, language arts)" (p. 186).

Courage

The DiG is a participatory process, with each member of the group gently invited to contribute to the learning process. It is recognized that it takes confidence to share the learning in a group, which can make people feel vulnerable. The courage needed to share their learning journey leads to an increase in resilience. These concepts will be explored further here.

Confidence. Confident students are better able to perform under pressure and they have higher levels of resilience, allowing them to rebound from tough situations and get back on track. For students to have the confidence to push themselves out of their comfort zone to reach deeper learning, they need courage (Cengage, 2023). Having confidence is important for building one's learner identity because it helps students take risks, overcome challenges, and persist in the face of adversity. Norman and Hyland (2003) identified in their study that lack of confidence is a barrier to learning and that social interaction is a factor in increasing confidence. This is reinforced by a study that found out that "students with self-confidence can lead them [to] improved

participation, enjoy learning, reduced test anxiety, increased interest in goal seeking, growth of comfort with their lecturers and classmates and finally help them in sharing their experience and opinions in the class" (Akbari & Sahibzada, 2020, p. 15).

Vulnerability. Vulnerability is generally understood to be the state of being exposed to the possibility of harm or damage. However, being vulnerable is important for building one's learner identity because it helps learners develop a deeper understanding of themselves and their learning process. Robinson (2021) points out that although there are many reasons why engaging in authentic reflection practices is helpful for students and educators, there is a reluctance to do so because of the level of vulnerability required. Furthermore, being vulnerable in the classroom can lead to learning breakthroughs in students and create a community of people who care for one another.

Huddy (2015) points out that many studies show that "one of the most effective ways to build trust is through displaying emotional vulnerability and connecting human to human" (p. 96). Palmer (2017) states that it is important for educators to show up as vulnerable with their students, "To reduce our vulnerability, we disconnect from students, from subjects, and even from ourselves. . . . We distance ourselves from students and subject to minimize the danger—forgetting that distance makes life more dangerous still by isolating the self" (p. 17-18).

Resilience. Resilience is generally understood as the ability to recover from setbacks, adapt to change, and keep going in the face of adversity, "the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to external and internal

demands" (APA). Gündoğan (2023) shares various definitions of the concept of "psychological resilience" (PR). It is defined as the competence to comply and improve in the face of an important risk situation (Masten & Coatsworth, 1998). Coutu (2022) suggests that individuals with strong PR have three characteristics: "a robust belief that life is meaningful, acceptance of actuality, and the capability to improvise" (p. 5). PR enables individuals to produce an effective solution to problem situations faced in their daily lives. In addition, PR has a positive and supportive contribution to individuals' making useful choices for themselves (Collins, 2008 as cited in Gündoğan, 2023, p. 289). Having resilience is important for building one's learner identity because it helps learners take risks, overcome challenges, and persist in the face of adversity.

Connection

By co-creating a culture of connectedness, educators can increase the engagement, trust and creativity in their classrooms.

Engagement. Student engagement is "receiving much attention all over the world and underpins so many other priorities such as retention, widening participation and improving student learning generally" (Bryson, 2014, abstract). Halverson and Graham (2019) differentiate between cognitive and emotional engagement. In general, engagement refers to the degree of involvement, interest, and enthusiasm that learners show toward their learning. Their study found that learner engagement correlates with important educational outcomes, including academic achievement, persistence, satisfaction, and sense of community.

Trust. One of the factors that can contribute to the development of a positive learner identity is trust. Landrum et al. (2015) have presented a theoretical framework that explains how “the automatic psychological reasoning involved in trust and learning creates a dynamic process of social learning that evolves over time” (p. 3). This acknowledges that there needs to be a relationship of trust between the student and the educator in order for the student to learn. As Cohn-Vargas and Steele (2015) point out, “teacher warmth and availability for learning and positive student relationships [is] foundational for trust” (section 3).

> It is only through a sense of trust that students will embrace an empowering experience of freedom, and the exercise of this freedom requires a risk on behalf of students and their teacher. This is the experience and risk of having to face a world beyond absolutes, and yet live and learn in a meaningful way. (Curzon-Hobson, 2002, p. 266)

This explanation of trust as it relates to learning also emphasizes the importance of the student-educator relationship and how trust is a foundational aspect of vulnerability; trusting the educators to provide appropriate support, guidance and feedback. One of the Agile principles states, “Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done” (Agile Manifesto, 2001, para 5). This illustrates the importance of trust in the process, an inclusive culture and trusting the people involved.

Creativity. One of the factors that can contribute to the development of a positive learner identity is creativity. Creativity is defined as “not just taking in knowledge but doing something in the field,” (Mehta, quoted in Mineo, 2019, para. 7). It is the ability to generate novel and valuable ideas, products, or solutions using critical thinking skills (Mayer, 1989). Beghetto and Karwowski (2018), called for clarification of the relationship

between creativity and learning and Karwowski et al. (2020) studied the relationship between academic achievement and creativity. There is general agreement that personalized learning is connected to creativity.

There are many studies that have explored the impact of teaching, the learning environment and teacher ethos on the creativity of students implying that creativity can both be developed and is an innate quality within all of us (as cited in Lin, 2011). In a study in which the teachers aimed to nurture and develop the creative potential of their learners through empowering them to make decisions for themselves about their own progress and learning directions, it was found that there was a positive effect on teacher confidence and capability (Davies, 2013).

Conclusion

This literature review provided an overview of the research as it relates to personalized learning, transformative learning and the latest neuroscience research on how we learn. The history of the DiG learning framework provided a context for the three tenets: curiosity, courage and connection. The LID survey characteristics, categorized under the three tenets of the DiG, have been researched and connected to learner identity. In the next chapter, the research methodology and methods will be defined and described.

CHAPTER III: RESEARCH METHODS

The intention of this research study was to assess the impact of the Designed inGenuity Learning Framework on ninth- and tenth- grade students in an international school in Ethiopia. Impact on learning, as a verb, is a subjective experience that is difficult to measure, and therefore, the metric of learner identity, as defined above, has been adopted. Changes in the nine characteristics of learner identity as named in the LID survey and a thematic analysis of the students' and educators' reflections will be used to identify the impact. The DiG learning framework, based on neuroscience and the psychological understanding of how we learn, guides students on a personalized, transformative and self-directing learning journey. Therefore, the results will be analyzed in the context of the three themes of Personalized Learning (PL), Transformative Learning (TL) and Self-Directed Learning (SDL).

Methodology

A convergent mixed-methods approach was used to collect both quantitative and qualitative data. This study uses convergent parallel design, taking qualitative and qualitative data collection and analysis and comparing or relating the two and then interpreting them. Younas et al. (2023) explain that integrating qualitative and quantitative methods, data, and findings is of utmost importance in mixed-methods research (MMR) and distinguishes MMR from monomethod research. This methodology was chosen because the researcher was curious about the consistency of the data. The strengths of this approach are that it is possible to test congruence in the study results and identify patterns across the data. The weaknesses of this approach are that it can be time consuming, tedious and the interpretation of the results can be biased. Areas of

convergence or divergence between the qualitative and quantitative results will be discussed in the concluding chapter.

Population

All ninth- and tenth-grade students and educators who participated in the DiG were included in this study. There were 140 students from ages 14 to 16. There were 17 educators of whom 10 participated in their first DiG experience before guiding students through a DiG. However, no educators had guided students through a DiG before.

This study was conducted at an urban Ethiopian school whose population can be described as students from international backgrounds, with diverse socioeconomic backgrounds. No specific data about age, gender and nationality was gathered from either the students or the educators.

Ethical Considerations

This study was approved by Antioch University's Institutional Review Board and informed consent for all participants was obtained, as per the Ethiopian Guidelines that "research conducted in established or commonly accepted educational settings, involving normal educational practices" are exempt (FDRE, 2014, p. 40). The school signed a Letter of Authorization to gather this data as part of the standard practice in this school setting (see Appendix A).

Participation in this study was voluntary. Participant confidentiality was achieved by the school deleting identifying information before sharing the data with the researcher. Results are reported in the aggregate so that participants remain anonymous. Permission was received from the educators to record and transcribe the conversations with them. The recordings of these conversations were kept in a secure

location and deleted after transcription, with all identifiers deleted. All data is kept in a secure location that is password protected. The name of the school is kept anonymous.

There were no foreseen risks with this study as the data was anonymous and aggregated. The anticipated benefits of the research are that there will be greater clarity for the participants and interested parties–parents, teachers and school leaders–regarding whether the school should move to more personalized learning experiences throughout the school experience. For society at large, this study will provide information about what the possible impact of DiG learning experiences could be on ninth- and tenth-grade students and whether the DiG is beneficial to empowering creative learners.

The researcher was employed as a consultant by the school to guide participants through this experience using the DiG Learning Framework. Any compensation received is independent of the study and its results.

This research study included two surveys, two questionnaires and reflection sessions with educators (see Appendices):

- Appendix B: Pre-Learner Identity survey–administered before the learning experience.
- Appendix C: Mid-DiG questionnaire–administered in the middle of the experience.
- Appendix D: Retro questionnaire–administered after the experience.
- Appendix B: Post-Learner Identity survey–administered after the learning experience.
- Appendix G: Learning Questions–administered on random days throughout the experience.

Methods

The research method of surveys, questionnaires and interviews was chosen because they are a regular part of the learning experience for the students and

educators. Google Forms were chosen as the most convenient method available to digitally collect data. They were distributed to the students through the online platform used by the school.

LID Survey

Quantitative data has been gathered through a nine-question survey that uses a Likert scale of 1 (strongly disagree) to 5 (strongly agree). The survey was distributed at the beginning and at the end of the learning experience to gather pre- and post-data. Quantitative data was collected anonymously and aggregated to produce the results. This study uses a radar chart to analyze the quantitative data.

The guidance given for the collection of both the pre- and post-data was to be honest about how the students see themselves as a learner. The intention was to encourage the students not to be aspirational but to assess themselves according to their own perception at that moment. The educators were encouraged to ensure that all students completed the surveys. If students were absent on the day that the survey or questionnaire was distributed, the educators were asked to direct the students to the online platform to complete the questions. Any resistance to completing the survey was responded to with an explanation of the purpose of this research. Some students completed the survey and questionnaire when reminded of the importance of their voice in this study. If a student did not complete the survey, it was not possible to ensure participation as the survey was anonymous.

Mid and Retro Questionnaire

The mid and retro questionnaires gathered quantitative data through question one; a multiple-choice question. The data was then analyzed by totalling up the number

of responses to each option. Qualitative data has been gathered through short- and long-answer questions. Qualitative data was collected anonymously with no identifying information requested. The mid-DiG questionnaire was distributed two weeks into the study. The final retrospective questionnaire was issued at the end of the four weeks. It was not possible to ensure that all questionnaires were completed because the data was anonymous.

Teacher Conversations

The surveys and questionnaires are complemented with anecdotal stories from interviews with educators. These non-identifiable quotes come from recordings of meetings with educators, some facilitated by the researcher and others facilitated by educators in the school. All were created in the context of engaging in a guided reflection process, using the Learning Questions (Appendix F). The intention was to gather their observations, their feelings about the process, statements of impact, insights and other information related to the impact of the DIG on the students. Also included in the study is an analysis of the educators' independent reflections where they choose to reflect using a protocol called the Adaptive Schools Process (Garmston & Wellman, 2023) after the experience was completed (Appendix G).

Commentary on Methods

The reliability of these instruments is difficult to measure because they rely upon the mindset of the person answering the question at the time. It is not possible to know if the surveys, questionnaires and interviews were completed at a different time, place and by a different researcher, the results would be the same. The instruments are valid as they provide a snapshot of the self-assessment of the student at that moment in time

and place. In order to assess the validity of the results, the quantitative data is compared to the qualitative data to see if there is alignment in the results.

Data Analysis Method

LID Survey

To analyze the quantitative data, a radar chart, or spider or web chart, was created from the pre- and post- data. This is a graphical method of displaying multivariate data in the form of a two-dimensional chart with three or more quantitative variables represented on axes starting from the same point. Each variable is plotted along a separate axis that starts from the center and extends outward, and the resulting shape can help visualize patterns or trends in the data. This method is visually effective for identifying patterns and trends in the data. Assessing the impact of the DiG on the students' learner identity is a multifaceted and complex task with multiple variables; the radar chart helps to visualize the impact on the nine indicators of the Learner Identity survey.

Mid and Retro Questionnaire

Question One.

The data was analyzed using percentage calculations to represent the data.

Qualitative Data.

For the qualitative data from the questionnaires, ChatGPT Version 3.5 was used to conduct a thematic analysis of the responses to the mid-DiG and retro questionnaires. For each question (not 1) the following prompt was used: "Identify the themes from these responses to the question, [insert question]." This was done with each question from the questionnaires.

Delimitations and Limitations

Delimitations

The following delimitations set the boundaries for my research. One delimitation is the geographical location of Ethiopia. The war in this country means that the learning experience could be interrupted at any time; placing additional stress on the participants. However, this location is where an opportunity to conduct this research was identified and it was beyond the scope of this thesis to have more locations included. Another delimitation is the sample size as it was beyond the scope of this thesis to include more students. A third delimitation was to only collect anonymous and aggregated data from voluntary participants in order to meet the requirements of the Institutional Review Board. Also, since the data was gathered anonymously, it was not possible to enforce a requirement on all students to complete all surveys and questionnaires.

Limitations

This study had limitations that could impact the generalizability of the results. First, the study was conducted at the end of the school year, which led to a decrease in survey and questionnaire participation at the end of the experience; some students had already left school for the summer break. During the experience, it emerged that there was a bias against PLEx from both educators and students due to past negative experiences. Both parties shared that in the past there was a lack of structure and that the projects had little impact on the students or the world. A third limitation of the study was that only ten of the seventeen educators experienced the DiG as learners themselves. This impacted their ability to effectively guide the students through the

framework process. Finally, this study was only undertaken at one international school; the study may not be generalizable to other international schools.

This research will inform future studies of the potential impact of the DiG and the lessons learned from the limitations of this experience will inform future research. This will be discussed further in the final chapter.

Conclusion

This study uses a convergent mixed-methods approach. Quantitative data was gathered through online surveys using a Likert scale and analyzed using a radar chart. Qualitative data was gathered from students through questionnaires and a thematic analysis was conducted using ChatGPT. Qualitative data was gathered from educators using transcribed discussions and analyzed by the educators using the Adaptive Schools Process.

This research may be shared globally as the conclusions contribute to the discussion about the value of personalized learning experiences.

CHAPTER IV: RESULTS

The hypothesis of the study is that the DiG learning framework would have an impact on the learner identity of ninth- and tenth-grade students participating in a personalized and transformative learning experience, the DiG, in an international school in Ethiopia. This study used a convergent mixed-methods approach to collect data. Quantitative data was collected from the students and qualitative data was collected from both the students and the educators. The impact is measured through a change in the learner identity of participants through a radar chart analysis of the quantitative data and a thematic analysis of the qualitative data.

The hypothesis that the DiG experience would have an impact on the students' learner identity was proven correct by both measures.

LID Survey

Quantitative data was gathered using a pre- and post-DiG survey using a Likert scale of 1 to 5 (Appendix A). The table below shows the average of the Likert scale in each survey and the percentage change across the aggregated and anonymous results.

Table 1

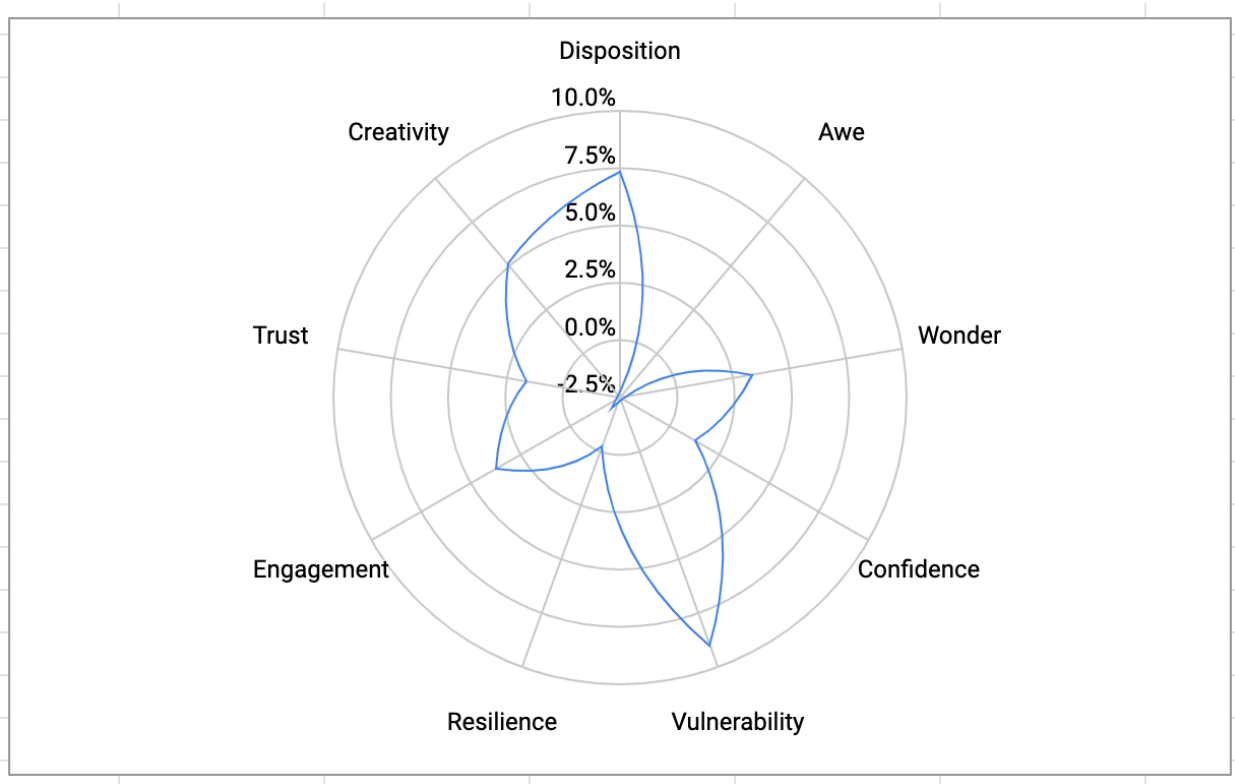
Pre-DiG and Post-DiG Survey Results

	Pre-DiG survey (Average of Likert)	**Post-DiG survey (Average of Likert)**	**Change (%)**
Curiosity			
Disposition	3.4	3.7	+7.3%
Awe	3.7	3.6	-3.1%
Wonder	3.5	3.6	+3.4%
Courage			
Confidence	3.7	3.8	+1.3%
Vulnerability	2.7	2.9	+9.0%
Resilience	3.8	3.8	-0.3%
Connection			
Engagement	3.9	4.0	+3.8%
Trust	3.8	3.8	+1.6%
Creativity	3.8	3.9	+5.1%

The figure below illustrates in a radar chart the percentage change in the average Likert scale results across the LID survey characteristics.

Figure 1

Radar Chart: Pre and Post DiG Survey Results



Mid and Retro Questionnaires

Quantitative and qualitative data was gathered through mid-DiG and post-DiG questionnaires.

Question One

A total of 125 students responded to the mid-DiG questionnaire. The following is a breakdown of responses to the first question: “Overall, how is your learning journey going?” A total of 96 students responded to the retro questionnaire. This table includes a breakdown of the responses to the first question: “Overall, how did you like the new experience of learning through a DiG?”

Table 2

Results from Question 1 for Mid-DiG and Retro-DiG Questionnaire

	Mid-DiG n=125		Retro-DiG n=96	
I am loving it! / I loved it!	19	15%	1	1%
I like it. / I liked it.	59	47%	34	35%
I am unsure/ I'm not really sure. / I liked some parts.	42	34%	46	48%
I don't like it. / I didn't really like it.	5	4%	13	14%
I hate it! / I hated it!	0	0%	2	2%

At the halfway point in the four-week experience, the majority of students (63%) responded that they were loving or liking their DiG learning journey. There was some uncertainty expressed by just over a third of the students (34%) and only a small

percentage (4%) expressed a dislike of the DiG learning journey. No students reported they hated the DiG learning journey.

At the end of the DiG experience, just over a third (36%) of the students responded that they loved or liked learning through a DiG. The majority of students (48%) responded that they were unsure or liked some parts. A small number of students (16%) expressed negative sentiments about the DiG experience, sharing that they didn't really like it or they hated it.

Qualitative Data

Qualitative data was gathered through the mid and retro online questionnaires. Reflection sessions with educators were recorded and transcribed and a reflection document created using the Adaptive Schools Process was provided to the researcher.

ChatGPT Version 3.5 was used to conduct a thematic analysis of the responses to the mid and retro questionnaires. For each question (not 1) the following prompt was used: "Identify the themes from these responses to the question, [insert question]." The themes were then organized into three main categories.

1. Personalized learning
2. Transformative learning
3. Self-directed learning

Personalized Learning

ChatGPT revealed three major themes in relation to personalized learning:

- Personalization and Relevance;
- Learning Opportunities and Skills Development; and
- Freedom and Independence.

Personalization and Relevance. Many students identified that they were happy to be able to engage in and explore their own interests. They shared that they liked the process “because it helped me learn more about my main interests which are sports and medicine combined.” They also commented, “I liked how it was individual and totally about what we liked and were interested in.” Students shared the connection to learning, “I liked that we researched about what we want to learn about and there were some pointers that helped us research a specific topic that we are interested in and learn from that research.” They shared the relevance of their research, “I can explore my interests and work on things that have significance to me.” Others shared their enjoyment of practical experiences, such as visiting NGOs and having interactions outside the traditional classroom setting.

On the other hand, some students expressed some concerns about the process, “Even though my interests were supposed to be the focus of my journey 90% of the time, it didn’t feel like it because it felt like every session, we had to reflect on the connections between our base and scramblers.” Some questioned the relevance of the educator check-ins: “I focused more on saying the right things and checking off a checklist when reflecting or conversing with some of my teachers.”

Learning Opportunities and Skills Development. Students shared that they experienced some unexpected discoveries during their personalized research, such as historical information about a location, surprising statistics, or specific insights into AI and art. There were also surprises related to nature and the environment, such as the impact of plastic pollution on ocean life or the cultural significance of nature in different countries. Surprises related to sports and fitness, such as the impact of being fit on reducing health problems, the pattern used for a football or insights into plyometrics and biomechanics. There were many personalized opportunities for learning and the students shared a wide variety of surprises related to culture; food, art and mental health. A student shared that they were, “Surprised that I got to conduct interviews and learn about people's different experiences.”

When thinking about the development of skills and techniques related to using technology, communication and networking, they shared that the experience, “Taught me methods of making a powerful speech such as emotion, novel and memorable.” Others shared that they learned new skills, such as coding, operating a sewing machine to upcycle clothes and exploring musical instruments. Another example was, “Surprised to know that I can plant seeds in boxes.” A different student shared that they were, “Surprised by the different types of injuries I found that I did not know about before I started my project.” They also shared that they learned from the process, “I gained so much knowledge and information from my learning experience.”

Freedom and Independence. Students expressed an appreciation for the freedom to choose and work on projects that they are passionate about, as well as the autonomy to control and plan their work according to their interests, “I liked how we had

lots of freedom, to explore different ways of learning" and "Getting to choose my own learning and going at my pace." Another student shared, "I'm really enjoying the freedom I have and the way I am able to accomplish what I have planned for." The students expressed an appreciation for the independence of teaching themselves and "having the learning in my own hands." Some of them explicitly stated that "I enjoyed learning through a DiG because I got to be independent."

On the other hand, some students shared that they "Didn't like how we were required to use this method when PLEx is supposed to be a personalized learning experience, and we should be choosing our own approach to our projects." They felt that "it was focused on the DiG a lot rather than our own project" and "instead of working on our projects individually, the DiG has caused us to focus a lot about scramblers, the base, and how it connects to our plex project." Others shared that they felt stuck and unable to progress beyond the research phase about their own interests. Some expressed that they felt unsure about the next steps in the project. Others shared that they did not feel like they had a lot of independence, "Didn't feel very personal, carefully supervised and organized by other teachers" and "[The DiG] may have helped some students, but considering that this is a personalized experience, I think it should be helpful to all students."

There were mixed feelings about the level of freedom, independence and autonomy, particularly over time management, "There was so much free/empty time. Many students including me didn't know what to do at that time." A recurring theme was the appreciation of freedom and trust in the learning process, with some students expressing the feeling of being forced into specific actions or schedules. Some students

offered feedback about a lack of structure and repetitive days, which led to boredom and a feeling of overwhelm, “I think teaching the basics of self-management and especially how to start would make a big difference for me.” Some students expressed the need for more independent time dedicated to working on individual PLEx projects, with some students feeling concerned about the time-consuming nature of the DiG with its exploration of scramblers and the base.

Transformative learning

Three major themes were discovered for transformative learning:

- Creativity and New Approaches to Learning
- Personal Growth and Reflection
- Meaningful and Purposeful Learning

Creativity and New Approaches to Learning. Some students shared positive feedback on the use of creative methods, “The freedom to have creative ideas and then go through with them” and new approaches to reaching project goals, “I like the new approach to plex and it is very interesting with everything that they want us to learn.” Students shared positive views on exploring through the DiG process, “I like how we have to think out of the box with the scramblers that are given and connect to my PLEx project.” They explained that, “What I like about my DiG journey is how my scrambler word has helped me see my project [from a] different viewpoint.” Another student shared, “What I am liking about my DiG journey is that my scramblers and my base [are] helping me bring more value to my project.” Some students recognized that

making unexpected connections between scramblers (like mathematics) and their projects demonstrated creative thinking. Another stated, “I'm enjoying how we are slowly digging deeper and deeper [into] our projects through understanding different scramblers.” Some students shared surprise at the complexity and breadth of individual projects, realizing that projects are more challenging and broader than expected, “The new approach to learning and how I can now differently connect my ideas” and “Surprised by the fact that we did a whole newer process and the artifacts.”

Conversely, some students shared a dislike of specific components of this new approach to learning, for example the scramblers, bases, and artifacts, “Didn't like the base, didn't find it to be helpful at all” and “Too many parts like new scramblers.” Some students experienced confusion or feeling unsure about certain aspects, such as the connection between their scrambler and their project. Those that found it challenging to connect their projects to their scramblers felt that they were unnecessary or added little value. Some expressed concerns that the DiG journey distracted from the actual PLEx project and affected the overall learning journey. Some offered feedback about the emphasis on creating artifacts and the preference for focusing on one artifact, “Kept taking time from us when we had to make the artifacts, talk about what surprises/wonders we had, etc.”

Personal Growth and Reflection. Students felt excitement about learning new things about themselves and personal growth in understanding. A student shared, “The “find your why” part I liked. Good self-discovery exercise.” Some students shared surprises related to personal growth, including the realization of personal preferences, learning styles, and the importance of patience in the learning process, “Surprised by

my ability to learn" and "Surprised that I was able to find out more about myself than I thought I would." A student shared, "Surprised by how unprepared I was for my project at the beginning of the week." Students expressed a desire for check-ins to help progress, general feedback, or coaching to support their learning journey. Many students shared that they appreciated that the DiG process, "Helped me learn more and get deeper into my plex project" and "That I discovered a lot about myself and that it was a nice experience." They went on to share that the educators, "Encouraged me to go deeper into new ideas" and "helped me get a great idea of who I am and better traits to myself as a learner." Looking ahead, a student suggested, "By creating more self-studying experience at school, I feel like students can better understand themselves as a learner." Another student shared a surprise, "How much I can still learn about topics I thought I grasped."

Students celebrated the opportunity for reflection and understanding oneself better as a learner through the DiG journey, "What I like about my DiG journey is that we have time for reflection." Another student shared, "I liked exploring my surprises and delights. I found myself thinking deeper into what I wondered and next steps for my Plex." They shared that, "I liked that I could look into my project from different dimensions which made my perspective much huger than it was." Others shared that they were, "Surprised by my courage and resilience in my learning and how I kept going" and delighted by "My potential that I showed while working."

On the other hand, some students shared that the check-ins are not enjoyable or helpful and that too much time was being spent on check-ins and reflections; feeling that they took too long or were repetitive or even, "Because they forced us to do

‘feedback’ and such every day.” A student shared that they, “Thought DIG sometimes distracted me from my actual project and led me away from the information my project actually included rather than relevant information.” Another student shared that they did not like the “continuous asking of what we now wonder.”

Meaningful and Purposeful Learning. Students’ positive experiences related to the meaningfulness and purpose of projects, “[The DiG] made my learning journey more meaningful.” The DiG “helped me gain a clear idea of what I wanted my PLEx project to be about.” They shared that they were able to make their projects more personally meaningful, “I liked how the scramblers made us find different ways of thinking about our project and topic we chose. It really made us think.” Students shared that the DiG process, “was super helpful when digging deeper into the information involving my Plex project. This gave me a better idea of why I was doing what I was doing and how it would benefit myself and others.” Another student shared, “What I liked about the DiG is that it made the actual process of the project the most important part. Most of the time was figuring out the purpose of the project and how it connected to certain concepts.”

Students shared that they were, “Surprised at the impact I could make on society through my Plex project.” They shared the enjoyment of projects that contributed to environmental sustainability and social impact, such as understanding the effect of art on mental health or the importance of stimulating babies. They shared that the DiG process helped them to recognize how their projects and learning can impact daily life, “The whole process made me think about why I chose the project I was doing.” Students shared surprises related to global and social issues, such as the impact of AI on professions, the challenges faced by NGOs, and the prevalence of gender-based

violence. They explained that, “I liked that we had time to really think about our project and really make sure that we had a definitive plan for it before we actually started.” Some students wondered, “how my impact would spread” and “How far can this project go?”

On the other hand, a student shared that the DiG, “focused too much on the actual planning and purpose of the project, limited time for the action phase.” Some felt that they were “constantly interrupted, made to do useless activities” and “weren't actually given much time to DIG.” Some students struggled with the meaning and purpose questions, “I didn't appreciate the freedom we had to change our project, as it made me feel like I had all the time in the world to brainstorm and see which direction I could take my project in.”

Self-Directed Learning

Three major themes were discovered for self-directed learning:

- Unexpected Discoveries in the Research
- Challenges and Complexity
- Connections & Broadening Perspectives

Unexpected Discoveries in the Research. A student shared that, “Although the timing is not right, the DiG process helps to fill different holes in my project.” When thinking about the DiG process, a student shared, “I enjoyed learning how to do deep research involved with something we like” and “I liked the sessions where we just researched.” They connected the base with the depth of their experience, “I enjoyed learning that I was able to learn more about what an empowered genius is and the way

it connects to my PLEx project." Another said, "The scramblers helped me develop new ideas and really think deeper about my project." A student shared that they were, "Surprised that I actually found a deeper meaning for my project."

A student unexpectedly discovered, "The process behind making a game is a lot more complicated than I expected, and this was surprising." They also discovered that they could expand their previous understanding, "I expanded my definition of what a genius is based on a book titled 'Talk Like TED.'" Another shared, "I was surprised by the strange foods that were eaten in the 1920s and the actual personality of J. Edgar Hoover." Other students shared that they were, "Surprised about how interested I actually am in my topic of female athletes" and "Surprised by how much I was able to learn about the world in relation to my story through the research I conducted while planning it." A student shared, "Discovering new things is the best feeling throughout the journey."

Challenges and Complexity. Some students experienced very specific challenges, "Surprised at how hard it was to work a sewing machine, I thought it would be easier but we ran into many problems." Some students expressed satisfaction with their progress and an appreciation for the productive working time provided during the DiG journey, even if they had made changes to their initial project idea. A student said, "Surprised by the progress I made and how many people want to get involved and help me with my learning." A student shared that, "The DiG has caused us to focus a lot about scramblers, the base, and how it connects to our plex project." Another shared, "I liked how much freedom we had and how much we could pivot our PLEx ideas."

They discovered the complexity of their project, “Surprised by how my plans were constantly adapting and changing instead of deciding on one idea at first and just working on that.” Other students shared that they were, “Surprised by the amount of possibilities there were in this project” and were “Surprised by how many times I changed my project, about 3-4 times.” Another student shared, “I was delighted by the progress I was able to make throughout PLEx, despite the complications.” There was another delight shared, “Delighted by how well my plan adapted depending on the circumstances of my learning journey at the time.”

Connections and Broadening Perspectives. An element of the student-directed learning impact of the process was the opportunity to collaborate with peers and share ideas, “I was delighted to spend my four weeks with people that had the same interests as me,” and “I like how I am with my friends on our plex project and it's not that boring.” They shared an enjoyment of sharing progress, feedback, and suggestions within the community, “Surprised by learning about different projects and understanding what people decided to do with their time in PLEx.” On the other hand, some students shared negative feelings about changes in grouping, preferring the original group over the current one. There were some concerns and suggestions related to group dynamics, including a preference for not changing groups frequently. Students shared feedback about the need for better time management within groups for more effective collaboration. Some students were surprised about challenges faced as a group, including facing challenges in group dynamics.

In terms of making connections between concepts and broadening perspectives, a student shared that they, “Enjoyed learning how to get out of my comfort zone” and “It

was a different, new and different view of PLEx.” They were “Surprised at the different connections I was able to create” and “Surprised that no matter what your project is, you will always be able to connect it to any concept.” Specifically about the base, a student shared that they were, “Surprised by how we can connect empowered genies [sic] to our plex project.” There was also a surprise that, “if anyone was to try a great effort, it's pretty simple in making a connection.” They were also surprised at the emphasis on “how much deep we dug into our scramblers, base, and plex project to connect all three.”

On the other hand, a student shared that they, “Didn't like how much time we spent on DIG and think we could have accomplished it in a shorter time.” Some students struggled to see how the DiG related to their project, “The whole thing with saying we had already started work on PLEx or that doing all of that stuff counted as our PLEx project when it didn't.” Another student said, “It should have been one more week of it, then the rest we work on our project.” Some students shared, “I would have liked it better if instead of wasting the first week with scramblers and bases and infinite brainstorming, I could have started our actual projects.”

These nine themes have revealed the impact of the DiG experience on the students in their own voice. Beyond the personalized, transformative and self-directed learning, many students expressed appreciation for the guidance and support from the educators. Comments such as, “Something that I liked about DiG is how it guided us through our learning, and how different teachers were always there to support us and follow us through our journey.” They expressed delight, “that the teachers tried their best to seem motivated about the whole journey and try to help make progress with our

project.” They were grateful for the support they received from educators, “I just want to give out a big thanks to the teachers again for being friendly, honest, helpful, encouraging…” Many students made positive remarks, “The constant support and guidance from teachers, who answer any questions you have.” A student shared that, “Something that delighted me was that the teachers allowed us to be independent in our work.”

On the other hand, one student shared, “No one really gave me advice or feedback on my project to see if it would really work with this PLEx framework.” Another student stated, “In the beginning of the journey, you asked on a survey what we require for our PLEx project, but we never actually got what we asked for. Provide us with materials for our project.” Some students highlighted the importance of having advisors with expertise matching their project and made requests for help with specific aspects of projects. They expressed a need for collaboration with more people in the field of technology or suggestions to provide opportunities for collaboration.

Educator Interviews and Reflections

Qualitative data was gathered from the educators through both reflection gatherings and an activity undertaken by the DiGgers who wanted to share their own reflections on the impact of the DiG on students. Nine themes emerged from the reflections that were guided by the Learning Questions (see Appendix G). A general comment that was made by the educators was that they would like to learn more about using coaching as a teaching tool.

Best practice. The DiG focused on student curiosities and interests represents best practice, placing “student voice and choice at the center” (Appendix H).

Powerful stories. The DiG process helped students to narrate their learning journey, some of which were inspiring.

Powerful questions. The Learning Questions (Appendix G) provided powerful guidance for reflections.

Framework for exploration. The DiG process provided students with the opportunity to explore, research, share and work on something that they are curious about.

Sense of purpose and intrinsic motivation. The DiG framework supported students to understand the “bigger picture” of their learning, why they care about things and to dig deep into who they are. This leads to greater awareness and motivation.

Independent thinking. Students need to see we, as educators, genuinely care about the process more than the product and that we trust them to really follow their own passion and interests. Helping students to connect concepts, engage in reflection and deep thinking by provoking them by asking insightful questions. Student ownership.

Deeper learning: helping the brain to recognize learning. Neuroscience of surprise, delight and wonder. Helping the brain to develop and easier to make connections.

Relevant learning. Increasing engagement through purposeful, meaningful and relevant learning that lasts and transfers. Strong connections.

Personalized learning that is playful. Not just know and regurgitate but to play with learning.

Discussion of Outliers or Anomalies

The two students who shared that they hated the process represent most of the contrary comments in the results section. One of the students shared long responses to each of the questions and therefore influenced the gathering of data processed by ChatGPT. The other student simply shared that they found the process too repetitive. This will be discussed further in the next chapter.

Limitations of Data Collection

One limitation of the data collection is that not every student completed the survey. As the data was aggregated and shared anonymously, the results are based on whoever completed the survey. Consequently, it is not possible to know what the impact of the learning framework was on a specific student or group of students. From the number of responses for each survey and questionnaire, it is possible to deduce that not all the students completed both surveys and the retro questionnaire. The impact of the missing data on the robustness of the conclusions are that the quantitative and qualitative data is not providing the complete picture of the selected population for this case study.

Conclusion

This chapter has shared the quantitative and qualitative results of this convergent mixed-methods study. The quantitative results of the students' self-assessment of their learner identity have been presented in a table and a radar chart. The qualitative data has been analyzed by ChatGPT and nine major themes were documented. Educator reflections and analysis have been shared.

In the following chapter, I will discuss the key findings from these results. Through an evaluation, I will share my interpretation and the implications of these findings. There will be a reminder of the perceived delimitations and limitations of the study as well as possible alternative explanations for the results. These lead to ideas for future research.

CHAPTER V: DISCUSSION AND CONCLUSIONS

This study measured the impact of the Designed inGenuity (DiG) learning framework on ninth- and tenth-grade students' learner identities in an international school in Ethiopia. The impact of the framework was measured using convergent mixed- methods; anonymous and aggregated quantitative and qualitative data was gathered from self-assessment surveys, questionnaires and reflections from both students and educators. The quantitative data was analyzed using a radar chart and the qualitative data was analyzed using a thematic analysis which revealed nine themes connected to personalized learning, transformative learning and self-directed learning. In addition, the educators shared nine themes from their own participation, observations and interactions in the DiG process and one recommendation.

The quantitative data gathered from the learner identity survey allows us to evaluate the effectiveness of the DiG framework in having an impact on learner identity. The key findings are that the framework had the greatest impact on students' level of vulnerability (under the tenet of courage), defined as "I am willing to tell others when I feel worried about my learning or don't understand something." This was closely followed by a positive change in the students' disposition (under the tenet of curiosity) toward demonstrating excitement about learning new things. This was followed by a positive change in the students' creativity (under the tenet of connection), defined as "I have creative ideas. I talk about my creative ideas and answers to problems. I love the opportunity to create." These findings suggest that the DiG, as a personalized and transformative learning experience, leads us to becoming more comfortable with

vulnerability while demonstrating a growth mindset and becoming more creative in our expression of new ideas and making new things.

The possibility that vulnerability will increase as a result of participating in a DiG is significant because it suggests the possibility for authentic reflection practices that move the learning forward for students. This form of courageous communication within the classroom can create a feeling of psychological safety and connection between educators and students that is conducive to deeper learning. The positive change in the disposition of the students suggests that the DiG is able to create the conditions for a "growth mindset" (Dweck, 2008). The process assumes that you are curious about something and are therefore willing to learn and extend your ideas about the world. The feeling of excitement increased for some students as a result of the DiG learning framework. In addition, according to the data, the DiG increased the students' perception of themselves as creative learners. This is particularly significant as the DiG is presented as a framework for the creative mind. In summary, the quantitative data reflects how the DiG asks you to dig deeper into your own story, creating the opportunity for you to share any concerns or uncertainties about what is being learned and creates the opportunity to make connections between new concepts and ideas.

The thematic analysis of the qualitative data revealed that the DiG learning framework creates the conditions for a personalized, transformative and self-directed learning experience. The data revealed the value of the DiG as a personalized learning process in which students choose what they learn about, develop skills and manage their own time. The experience of transformative learning was confirmed through students who were excited about the opportunities to be using a new approach to

learning and creatively making things; affirming the findings of the quantitative data of a positive change in disposition and creativity. There is also evidence that making meaning through a new approach to learning that emphasized reflection led to self-discovery and deeper thinking. Finally, the data showed that the DiG created possibilities for self-directed learning in which students broadened their perspectives through unexpected discoveries and overcame challenges and complexity by talking them through with others; affirming the positive change in vulnerability in the quantitative data. These findings were reinforced by the educator insights and reflections.

Along with these findings, the question emerged, “Why did the positive impact of the DiG on students’ learner identity not reach all the students to the same extent?”

> The idea of a personalized learning experience sounds amazing, especially considering how much our school system is based on such an old-school format, the same old content, and the same old assessment methods. The combination of students not taking this seriously for different reasons, not managing their time well, and the fact that PLEx was never executed well hasn't proved a good use for most students yet.
>
> –A ninth- or tenth-grade student

Using this reflection as a prompt, there is a need to evaluate both the impact of the framework and also the context in which the framework was introduced, the way in which it was presented and the impact of educator experience with the framework.

The specific context of the school impacted the experience for the educators and the students. There is an active war in Ethiopia, leadership of the school had changed and some educators had recently joined or changed positions within the school, reflecting the dynamic nature of an international school. Change in school leadership

impacts the culture of learning and teaching within the school and can create a high level of uncertainty and concern about what is being measured in terms of success. The educators who had recently joined the school mentioned needing time to understand the parental expectations of the experience. As mentioned in the quote, the students shared that their current experience of school and assessment is the same as those who have gone before. This context impacted the learner identity of the educators, particularly in terms of their trust in the new process introduced by new leadership, their willingness to be vulnerable with students and their confidence in guiding the DiG.

This study revealed that when introducing a new intervention into a school setting, it is essential that all stakeholders involved are fully informed of the expectations, the intention of the new method and details of the method itself. The expectation of the four-week experience from the students and the educators influenced the internal validity of this study. This was most clearly demonstrated when students were asked about their expectations and they responded with, “Chill time,” particularly as it was the last four weeks of the school year after end of year exams. The educators shared that their expectations were for the students to independently work on their project, ideally in silence and without causing disruption to them or other students. In terms of student engagement with the learning process, expectations were low from both students and educators who had experienced PLEx before.

However, the new leadership, including the Lead Facilitator, expected higher student engagement and that is why the DiG process was introduced. In addition, the level of deep learning expected by the Lead Facilitator was higher than other stakeholders. The intention of introducing the DiG to the students was not clearly

explained and therefore they were not prepared for the change in learning approach. Before beginning the DiG, both students and educators shared that as grades were not attached to the experience, the significance of the experience was not fully recognized. The expectations appeared to change as several months earlier, the students had been asked to share their final project idea. Therefore, when the DiG was introduced and it was explained that there would be a greater focus on the process of learning than the students' final product, the students were surprised and continued to request "more time for students to finish up their product correctly" and wondering if they had "passed." The timing of introducing the framework with different expectations had a significant impact on the students' experience with the DiG.

The constraint of time also had a significant impact on the educators' experience with the DiG. Only 10 of the 17 guides were given time to participate in the week-long professional learning experience of the DiG. The educators who participated in the DiG (DiGgers) had clarity that the intention of the learning framework is to inspire deeper learning and were committed to doing so. The educators who were *curious* about the process and voluntarily participated in the educator DiG shared that because they had *courageously* participated in a DiG themselves, they felt confident leading students through the process. In addition, they shared that they felt a strong sense of psychological safety and *connection* within the group, which gave them the confidence to experiment with the learning framework. They also felt a sense of agency to trust their intuition when guiding the students toward personalized and transformative learning. This leads to the key finding that the impact of the DiG on the students' learner identity was highly influenced by the learner identity of the educator leading the group.

Educators who had participated in the DiG more confidently guided the students to follow their curiosities to authentic surprise, connecting seemingly disconnected concepts with their lived experience and facilitated meaningful conversations that deepened and extended the learning.

There was a clear disparity between educators that had experienced the DiG process and those that had not. For the educators who had not experienced the DiG for themselves, this intervention lacked alignment and clarity, caused confusion and was challenging to understand. They repeatedly shared their uncertainty and insecurity about whether they were “doing it right.” The lack of time made available for the educators to attend a parent gathering that explained the process and to meet each other during regular work hours to both plan for the process and share reflections at the end of the day had a significant impact on the student experience of the DiG. Although efforts were made by the Lead Facilitator to create alignment with the process through group gatherings and reflections, a meaningful understanding of the value of these was not achieved. This led to repetitive use of the Learning Questions (see Appendix G) with the students and they detected an inauthenticity in its overuse. This shows that it is essential for educators to have experienced the DiG for themselves before guiding students.

Intrinsically connected to the students’ sense of psychological safety was the educators’ feelings of the same and their willingness to be vulnerable with the students. The DiGgers who were willing to share their own experiences of the DiG anecdotally shared that their students were willing to be more vulnerable as a result. In addition, it appears that students who worked with educators who modeled a growth mindset by

being willing to share that they did not know all of the answers and that in this work there is no one right answer, experienced a positive impact on their disposition. The educators who were willing to walk with the students through their creative journey, encouraging them to make decisions about their own progress and directions are likely to have had the greatest impact on the students' perception of their own creativity. The importance of the educator modeling the characteristics of learner identity within the three tenets of the DiG is a possible area of further research.

As a result of this study, several ideas for future research have emerged to support the implementation of the DiG learning framework in schools. There are three distinct implications of the findings in this research:

1. The practice of learning and teaching: The adults' perception of their role in relationship to the student has a significant impact on the students' engagement with their learning journey. In order to guide students through a transformative learning experience that is led by their own interests, professional learning and teacher training needs to be reimagined toward deeper listening, the three tenets of the DiG and a focus on personalized learning.
2. The introduction of interventions in schools: It is essential to clearly explain the purpose of innovative practices to all stakeholders when bringing them into the learning environment.
3. School and government policy regarding teacher workload in schools: This work has the potential to influence educational policy in all contexts as it highlights the importance of prioritizing time for reflective practices and

receiving feedback. In addition, the study revealed the importance of educators receiving regular coaching to know how to guide student engagement with the process of learning as a creative endeavor.

Final Thoughts

This study was inspired by the desire of an educator to create the conditions for personalized and transformative learning in a school setting. The hypothesis was that introducing the DiG learning framework would have an impact on the students' learner identity. The results show that the DiG had both positive and negative impacts. The discussion has explained that many factors contributed to these results. One key finding was that for educators to effectively guide students through a DiG to positively impact the students' learner identity, they need to have experience of the DiG for themselves and for the learning framework to have had a positive impact on their own learner identity. The second key finding was that students need to repeatedly experience the DiG in order to experience a transformation in their perspective of personalized learning. The third key finding was related to the larger question about the role of educators in schools and a need to consider why they are essential to the students' learning journey, who they are and what they are there to do. This question has overarching implications for the concept of learning and schools as places of learning. Going forward, the DiG learning framework requires further study in order to test these new hypotheses.

Currently, the DiG learning framework is being used in elementary, inquiry-based schools in Queensland, Australia (Morrison & Turner, 2021); State Middle Schools in Ohio, USA and a primary state school in Oxford, England. This is the first formal study

to explore the impact of the DiG on students and currently no papers or formal studies have been undertaken in any of these three locations. The practical implications of this research are multifold as it has been conducted in the context of the well-documented need for the transformation of education systems around the world. The complexity of the international, national and local school systems mean that there is no one solution to the problems that have been identified by many commentators. As the DiG is based on the Agile framework which is intrinsically an approach of adapting, pivoting and personalizing according to context, it may offer a path toward achieving the transformation desired.

In the context of a crisis of teacher retention around the world (García et al., 2023), the gap in research of the impact of the DiG on educators in terms of their connection with peers, educator learner identity and educator agency as a solution-seeker is the next planned study. The aspiration is to reframe the role of the adult in school from teacher to educator to coach to learning facilitator and, ultimately, guide so that the conditions are created for students to become creative learners who are empowered to seek sustainable solutions to the world's greatest challenges. The question that has emerged is, "How might educators be inspired to create the conditions for purpose-driven learning in an ever-changing world?"

References

Agile Manifesto. (2001). https://agilemanifesto.org/principles.html

Agyapong, B., Obuobi-Donkor, G., Burback, L., & Wei, Y. (2022). Stress, Burnout, Anxiety and Depression among Teachers: A Scoping Review. International journal of environmental research and public health, 19(17), 10706. https://doi.org/10.3390/ijerph191710706

Akbari, O., & Sahibzada, J. (2020). Students' self-confidence and its impacts on their learning process. American International Journal of Social Science Research, 5(1), 1-15.

Arroyo, I., Woolf, B. P., Burelson, W., Muldner, K., Rai, D., & Tai, M. (2014). A multimedia adaptive tutoring system for mathematics that addresses cognition, metacognition and affect. International Journal of Artificial Intelligence in Education : Official Journal of the International Aied Society, 24(4), 387–426. https://doi.org/10.1007/s40593-014-0023-y

Association for Psychological Science. (2011, October 28). Curiosity is critical to academic performance. ScienceDaily. Retrieved November 26, 2023 from www.sciencedaily.com/releases/2011/10/111027150211.htm

American Psychological Association. (n.d.). Resilience. American Psychological Association. https://www.apa.org/topics/resilience

Bandura, A. J. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice Hall.

Beaty, R. E., Kenett, Y. N., Christensen, A. P., Silvia, P. J., & Sporns, O. (2018). Robust prediction of individual creative ability from brain functional connectivity. Proceedings of the National Academy of Sciences, 115(5), 1087-1092. https://doi.org/10.1073/pnas.1713532115

Beghetto, R. A., & Karwowski, M. (2018). Educational consequences of creativity: A creative learning perspective. Creativity. Theories–Research-Applications, 5(2), 146-154.

Bennett, D. (2015). The Neural Mechanisms of Bayesian Belief Updating. Journal of Neuroscience, 35(50), 16300-16302. https://doi.org/10.1523/JNEUROSCI.3742-15.2015

Blackwell, L. S., K. H. Trzesniewski, and C. S. Dweck. 2007. Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. Child Development 78 (1): 246–63

Bray, B., & McClaskey, K. (2014). Making Learning Personal: Empowering Students to Take Charge of Their Learning. Corwin Press.

Brown, B. (2018). Dare to lead brave work. tough conversations. whole hearts. Ebury Publishing.

Bryson, Colin. (2014). Understanding and developing student engagement. Routledge. https://doi.org/10.4324/9781315813691

Bunce, L. T. (2021, December 16). Building student identities as learners, not consumers, for better academic outcomes. Times Higher Education. https://www.timeshighereducation.com/campus/building-student-identities-learners-not-consumers-better-academic-outcomes

Cengage. (2023, May 2). Why confidence matters: Today's learner: Cengage. Today's Learner. https://todayslearner.cengage.com/why-confidence-matters/

Chen, C. M. (2008). Intelligent web-based learning system with personalized learning path guidance. Computers & Education, 51(2), 787-814.

Cohn-Vargas, B., & Steele, D. M. (2015, October 21). Creating an identity-safe classroom. Edutopia. https://www.edutopia.org/blog/creating-an-identity-safe-classroom-becki-cohn-vargas-dorothy-steele

Cornelius-White, J. (2007). Learner-Centered Teacher-Student Relationships Are Effective: A Meta-Analysis. Review of Educational Research, 77(1), 113-143. https://doi.org/10.3102/003465430298563

Coutu, D. L. (2002). The Anxiety of Learning. The HBR Interview. Harvard Business Review, 80(3), 100-6.

Cranton, P. (2006). Understanding and promoting transformative learning: A guide for educators of adults (2nd ed.). San Francisco: Jossey-Bass.

Curzon-Hobson, A. (2002). A pedagogy of trust in higher learning. Teaching in higher education, 7(3), 265-276.

Darbor, K. E., Lench, H. C., Davis, W. E., & Hicks, J. A. (2016). Experiencing versus contemplating: Language use during descriptions of awe and wonder. Cognition and Emotion, 30(6), 1188-1196.

Davies, T. (2013). Incorporating creativity into teachers practice and self-concept of professional identity. Journal of Educational Change, 14(1), 51–71. https://doi.org/10.1007/s10833-012-9192-3

Dirkx, J. M. (2012). Nurturing soul work: A Jungian perspective on the transformative potential of adult education. Journal of Transformative Education, 10(1), 19-36.

Dougherty, N. (2021, October 4). Personalizing learning: The goal is student ownership. Education Elements. https://www.edelements.com/blog/personalizing-learning-the-goal-is-student-ownership

Dweck, C. S. (2008). Mindset. Ballantine Books.

Ekman, P., & Cordaro, D. (2011). What is meant by calling emotions basic. Emotion review, 3(4), 364-370.

Engel, S. (2011). Children's Need to Know: Curiosity in Schools. Harvard Educational Review, 81(4), 625-645,784.

Engel, S. (2013). The case for curiosity. Educational Leadership, 70(5), 36-40.

Engel, S. (2015). The hungry mind: The origins of curiosity in childhood. Harvard University Press.

FDRE Ministry of Science and Technology. (2014). National Research Ethics Review Guideline: Fifth Edition.

Frankl, V. E. (1992). Man's search for meaning: An introduction to logotherapy / Viktor E. Frankl ; part one translated by Ilse Lasch ; preface by Gordon W. Allport. Beacon Press books.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences of the United States of America, 111(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Friston, K., FitzGerald, T., Rigoli, F., Schwartenbeck, P., & Pezzulo, G. (2017). Active inference: A process theory. Neural Computation, 29(1), 1–49. https://doi.org/10.1162/neco_a_00912

García, E., Kraft, M. A., & Schwartz, H. L. (2023, July 19). Are we at a crisis point with the public teacher workforce? education scholars share their perspectives. Brookings. https://www.brookings.edu/blog/brown-center-chalkboard/2022/08/26/are-we-at-a-crisis-point-with-the-public-teacher-workforce-education-scholars-share-their-perspectives/

Garmston , R., & Wellman, B. (2023). About adaptive schools. @ThinkCollab. https://www.thinkingcollaborative.com/aboutas#:~:text=Adaptive%20Schools%20is%20the%20%E2%80%9Chow,leading%2C%20teaching%2C%20and%20learning

Goodyear, P., Jones, C., Asensio, M. et al. Networked Learning in Higher Education: Students' Expectations and Experiences. High Educ 50, 473–508 (2005). https://doi.org/10.1007/s10734-004-6364-y

Greater Good Science Center at UC Berkeley. (2018, September). The science of awe: A white paper prepared for the John Templeton Foundation.

Gregorčič, M., & Jelenc Krašovec, S. (2017). Pedagogical dimensions of participatory democracy: Learning through self-organized communities and participatory budgeting in Maribor. In G. A. Koulaouzides & K. Popović (Eds.), Adult education and lifelong learning in Southeastern Europe (pp. 27–39). Rotterdam, The Netherlands: Sense Publishers.

Gregorčič, M. (2019). "16 The Impact of Transformative Learning on Social Transformations: A Comparative Study of Participatory Budgets in Maribor (Slovenia) and Rosario (Argentina)". In Power and Possibility. Leiden, The Netherlands: Brill. https://doi.org/10.1163/9789004413320_016

Gündoğan, S. (2023). The Mediating Role of Psychological Resilience in the Relationship between Quality of School Life and School Burnout. Journal of Theoretical Educational Science / Kuramsal Eğitimbilim Dergisi, 16(2), 287–304.

Hadzigeorgiou, Y. (2020). Wonder: Its nature and its role in the learning process. Wonder, education, and human flourishing, 185.

Halverson, L.R., & Graham, C.R. (2019). Learner engagement in blended learning environments: A conceptual framework. Online Learning, 23(2), 145-178. doi:10.24059/olj.v23i2.1481

Harper, D. (n.d.). Etymology of educator. Online Etymology Dictionary. Retrieved December 14, 2023, from https://www.etymonline.com/word/educator

Harper, D. (n.d.). Etymology of teach. Online Etymology Dictionary. Retrieved December 14, 2023, from https://www.etymonline.com/word/teach

Hedges, H. (2021). What counts and matters in early childhood: narratives of interests and outcomes. Journal of Early Childhood Research, 19(2), 179–194. https://doi.org/10.1177/1476718X20942939

Hood, N. (2023a, September 19). Learner identity. THE EDUCATION HUB. https://theeducationhub.org.nz/learner-identity/

Huddy, S. (2015). Vulnerability in the Classroom: Instructor's Ability to Build Trust Impacts the Student's Learning Experience. International Journal of Education Research, 10(2), 96–103.

Ito, M., Gutiérrez, K., Livingstone, S., Penuel, B., Rhodes, J., Salen, K., ... & Watkins, S. C. (2013). Connected learning: An agenda for research and design. Digital Media and Learning Research Hub.

Jones, M. G., Nieuwsma, J., Rende, K., Carrier, S., Refvem, E., Delgado, C., Grifenhagen, J., & Huff, P. (2022). Leveraging the epistemic emotion of awe as a pedagogical tool to teach science. International Journal of Science Education, 44(16), 2485-2504. https://doi.org/10.1080/09500693.2022.2133557

Karwowski, M., Jankowska, D. M., Brzeski, A., Czerwonka, M., Gajda, A., Lebuda, I., & Beghetto, R. A. (2020). Delving into Creativity and Learning. Creativity Research Journal, 32(1), 4-16. https://doi.org/10.1080/10400419.2020.1712165

Katz, L. G. (1993). Dispositions as Educational Goals. ERIC Digest. ERIC Clearinghouse on Elementary and Early Childhood Education, Urbana, IL. https://files.eric.ed.gov/fulltext/ED363454.pdf

Kidd, C., & Hayden, B. Y. (2015). The psychology and neuroscience of curiosity. Neuron, 88(3), 449-460.

Kitchenham, A. (2008). The evolution of John Mezirow's transformative learning theory. Journal of Transformative Education, 6(2), 104-123.

Klein, A. (2022, October 18). Tiktok challenges are a nightmare for schools. How should educators respond?. Education Week. https://www.edweek.org/technology/tiktok-challenges-are-a-nightmare-for-schools-how-should-educators-respond/2022/10

Kolb, A. & Kolb, D. (2009). On becoming a learner: The concept of learning identity. CAEL Forum and News. 5-13.

Kop, R., & Hill, A. (2008). Connectivism: Learning theory of the future or vestige of the past?. International Review of Research in Open and Distributed Learning, 9(3), 1-13.

Landrum, A. R., Eaves, B. S., & Shafto, P. (2015). Learning to trust and trusting to learn: A theoretical framework. Trends in Cognitive Sciences, 19(3), 109-111.

Lee, D., Huh, Y., Lin, C.-Y., & Reigeluth, C. M. (2018). Technology functions for personalized learning in learner-centered schools. Educational Technology Research and Development, 66(5), 1269–1302. https://doi.org/10.1007/s11423-018-9615-9

Liang, L., Yang, F., Cook, W.D., et al. (2006) DEA Models for Supply Chain Efficiency Evaluation. Annals of Operations Research, 145, 35-49. https://doi.org/10.1007/s10479-006-0026-7

Lieberman, M. D. (2015). Social: Why Our Brains Are Wired to Connect. Oxford University Press, Incorporated.

Lin, Y. (2011). Fostering Creativity through Education – A Conceptual Framework of Creative Pedagogy. Creative Education, 2, 149-155. doi: 10.4236/ce.2011.23021

López-Alcarria, A., Olivares-Vicente, A., & Poza-Vilches, F. (2019). A Systematic Review of the Use of Agile Methodologies in Education to Foster Sustainability Competencies. Sustainability (Basel, Switzerland), 11(10), 2915-. https://doi.org/10.3390/su11102915

Luvmour, B. (2006). Optimal parenting: Using natural learning rhythms to nurture the whole child. Sentient Publications.

Luvmour, J. (2011). Nurturing children's well-being: A developmental response to trends of overdiagnosis and overmedication. Journal of Humanistic Psychology, 51(3), 350–368. https://doi.org/10.1177/0022167810386958

Luvmour, J. (2010). Developing together: Parents meeting children's developmental imperatives. Journal of Adult Development, 18(4), 164–171. https://doi.org/10.1007/s10804-010-9111-x

Martin, A. J. (2011). Courage in the classroom: Exploring a new framework predicting academic performance and engagement.School Psychology Quarterly, 26(2), 145–160. https://doi.org/10.1037/a0023020

Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. American psychologist, 53(2), 205.

Mayer, R. E. (1989). Cognitive views of creativity: Creative teaching for creative learning. Contemporary educational psychology, 14(3), 203-211.

McAdams, D. P., & McLean, K. C. (2013). Narrative Identity. Current Directions in Psychological Science, 22(3), 233-238. https://doi.org/10.1177/0963721413475622

McEwan, A. E. (2008). Wonder and learning. The Educational Forum, 72(2), 108-114. https://doi.org/10.1080/00131720701804952

Mezirow, J. (1991). Transformative dimensions in adult learning. San Francisco: Jossey-Bass.

Mezirow, J. (1994). Understanding transformation theory. Adult Education Quarterly, 44(4), 222–232.

Mezirow, J. (2000). Learning as transformation : critical perspectives on a theory in progress (1st ed., Ser. The Jossey-Bass higher and adult education series). Jossey-Bass.

Mineo, L. (2019, August 23). A recipe for how high schools can Foster “Deeper Learning.” National & World Affairs. https://news.harvard.edu/gazette/story/2019/08/a-recipe-for-how-high-schools-can-foster-deeper-learning/

Morrison, T. (n.d.). Active Inference, http://wellspring.fed.wiki/active-inference.html, CC BY-SA 4.0, https://creativecommons.org/licenses/by-sa/4.0/. Retrieved August 21, 2023, from http://wellspring.fed.wiki/view/welcome-visitors

Morrison, T. & Turner, D. (2021). Creative Potential Unleashed. *The Queensland Principal*, 8-15.

Norman, M., & Hyland, T. (2003). The role of confidence in lifelong learning. *Educational Studies*, *29*(2–3), 261–272. https://doi.org/10.1080/03055690303275

Ogawa, S., Lee, T. M., Kay, A. R., & Tank, D. W. (1990). Brain magnetic resonance imaging with contrast dependent on blood oxygenation. Proceedings of the National Academy of Sciences of the United States of America, 87(24), 9868–9872. https://doi.org/10.1073/pnas.87.24.9868

Palmer, P. J. (2017). The courage to teach (20th ed.). Jossey-Bass.

Pane, J. F., Steiner, E. D., Baird, M. D., Hamilton, L. S., & Pane, J. D. (2017). How Does Personalized Learning Affect Student Achievement? RAND Corporation. https://www.rand.org/pubs/research_briefs/RB9994.html

Parkinson, S., Brennan, F., Gleasure, S., & Linehan, E. (2021). Evaluating the Relevance of Learner Identity for Educators and Adult Learners Post-COVID-19. The Irish Journal of Adult and Community Education, Volume(Issue), pp 74-96. https://www.aontas.com/assets/resources/Adult-Learner-Journal/ALJ%202021/AONTAS_Adult_Learner_2021_WEB.pdf

Patankar, S. P., Zhou, D., Lynn, C. W., Kim, J. Z., Ouellet, M., Ju, H., Zurn, P., Lydon-Staley, D. M., & Bassett, D. S. (2023). Curiosity as filling, compressing, and reconfiguring knowledge networks. Collective Intelligence, 2(4). https://doi.org/10.1177/26339137231207633

Patrick, S., Kennedy, K., & Powell, A. (2013). Mean What You Say: Defining and Integrating Personalized, Blended, and Competency Education. iNACOL, https://aurora-institute.org/resource/mean-what-you-say-defining-and-integrating-personalized-blended-and-competency-education/

Peterson, C., & Seligman, M. E. P. (2004). Character strengths and virtues: A handbook and classification. New York: Oxford University Press.

Porath, S., & Hagerman, D. (2021). Becoming connected learners through personalized learning. Middle School Journal, 52(2), 26–37. https://doi.org/10.1080/00940771.2020.1868058

Robinson, C., & Sebba, J. (2010). Personalising learning through the use of technology. Computers & education, 54(3), 767-775.

Robinson, K. (2006, February). Do schools kill creativity? [Video]. TED Conferences. https://www.ted.com/talks/sir_ken_robinson_do_schools_kill_creativity

Robinson, K., & Aronica, L. (2009) The Element: How Finding Your Passion Changes Everything. New York: Viking Adult.

Robinson, K. (2021). Critical reflection: A student's perspective on a 'pedagogy of Discomfort' and self-compassion to create more flexible selves. Reflective Practice, 22(5), 641–652. https://doi.org/10.1080/14623943.2021.1948825

Rodgers, C. (2002). Seeing student learning: Teacher change and the role of reflection. Harvard Educational Review, 72(2), 230-253.

Schmid, R., Pauli, C., Stebler, R., Reusser, K., & Petko, D. (2022). Implementation of technology-supported personalized learning—its impact on instructional quality. The Journal of Educational Research, 115(3), 187-198. https://doi.org/10.1080/00220671.2022.2089086

Shemshack, A., Spector, J.M. A systematic literature review of personalized learning terms. Smart Learn. Environ. 7, 33 (2020). https://doi.org/10.1186/s40561-020-00140-9

Shiota, M. N., Keltner, D., & Mossman, A. (2007). The nature of awe: Elicitors, appraisals, and effects on self-concept. Cognition and Emotion, 21(5), 944-963. https://doi.org/10.1080/02699930600923668

Siegel, D. (2010) Mindsight: The New Science of Personal Transformation. New York, NY: Random House Publishing

Siemens, G. (2005). Connectivism: A Learning Theory for the Digital Age. International Journal of Instructional Technology & Distance Learning, 2(1).

Stumm, Sophie & Hell, Benedikt & Chamorro-Premuzic, Tomas. (2011). The Hungry Mind -- Intellectual Curiosity Is the Third Pillar of Academic Performance. Perspectives on Psychological Science. 6. 574-588. 10.1177/1745691611421204.

Taylor, E. W. (2007). An update of transformative learning theory: A critical review of the empirical research (1999–2005). International Journal of Lifelong Education, 26(2), 173-191.

Taylor, E. W. (2017). Transformative learning theory in the practice of adult education: An overview. Adult Learning, 28(2), 62-68.

Turner, D. (n.d.). Designed InGenuity, http://david.reimage.fed.wiki/designed-ingenuity.html, CC BY-SA 4.0, https://creativecommons.org/licenses/by-sa/4.0/. Retrieved September 28, 2023, from http://book.reimage.fed.wiki/view/welcome-visitors

U.S. Department of Education, Office of Educational Technology (2017). Reimagining the role of technology in education: 2017 national education technology plan update. https://tech.ed.gov/files/2017/01/NETP17.pdf.

Walkington, C., & Bernacki, M. L. (2020). Appraising research on personalized learning: Definitions, theoretical alignment, advancements, and future directions. Journal of Research on Technology in Education, 52(3), 235-252. https://doi.org/10.1080/15391523.2020.1747757

Walsh, F. (2020). Loss and resilience in the time of Covid‐19: Meaning making, hope, and transcendence. Family Process, 59(3), 898–911. https://doi.org/10.1111/famp.12588

Whitehouse, S., Vickers-Hulse, K., & Carter, J. (2018). Curious teachers, create curious learners and great historians. Education 3-13, 46(6), 648–660. https://doi.org/10.1080/03004279.2018.1483800

World Health Organization. (2021, November 17). Mental health of adolescents. World Health Organization. https://www.who.int//news-room/fact-sheets/detail/adolescent-mental-health/

Younas, A., Fàbregues, S., & Creswell, J. W. (2023). Generating metainferences in mixed methods research: A worked example in convergent mixed methods designs.

Methodological Innovations, 16(3), 276-291.
https://doi.org/10.1177/20597991231188121

APPENDIX A: LETTER OF AUTHORIZATION FROM THE SCHOOL

5 May 2023

Antioch University
Headquarters
900 Dayton Street
Yellow Springs,
OH 45387

Please note that Ms. Kavita Tanna, AU Graduate Student, has the permission of [redacted] to conduct research at our Grade 9 and Grade 10 School Campus for her study, "What is the impact of the Designed inGenuity learning framework on Grade 9 and Grade 10 students in a traditional school setting in an Ethiopian International School?".

Ms. Tanna will be conducting this study in an established educational setting during the regular school time. The study will include gathering data from surveys and questionnaires that would be a regular part of the learning and experience of the students.

Ms. Tanna will aggregate the anonymous results. Ms. Tanna has also agreed to provide to my office a copy of the Antioch University IRB-approved, stamped consent document and will also provide a copy of any aggregate results.

If there are any questions, please contact me by email.

Signed,

APPENDIX B: LEARNER IDENTITY SURVEY

Curiosity

- Disposition

Definition: I am excited to learn. I show my excitement when the learning is not something I know about.

- Awe

Definition: I have had wonderful experiences that amaze me. These experiences make me want to learn more about myself and the world.

- Wonder

Definition: I like creating new ideas. I confidently share my ideas with others.

Courage

- Confidence

Definition: I encourage myself when I face a challenge. I know that challenges help me to learn.

- Vulnerability

Definition: I am willing to tell others when I feel worried about my learning or don't understand something.

- Resilience

Definition: I am calm about not knowing things YET. I am happy to say, "I can't do this YET."

Connection

- Engagement

Definition: I can learn independently. I know myself as a learner and talk about my goals. I work hard to achieve my goals.

- Trust

Definition: I trust myself and those around me. I believe that I have the ability to find my way through difficult situations and that I have people in my life to support and encourage me.

- Creativity

Definition: I have creative ideas. I talk about my creative ideas and answers to problems. I love the opportunity to create.

APPENDIX C: MID-DIG QUESTIONNAIRE

1. Overall, how is your learning journey going?
    a. I am loving it!
    b. I like it.
    c. I am unsure.
    d. I don't like it.
    e. I am hating it!
2. What are you liking about your DiG journey?
3. What are you not liking about your DiG journey?
4. What have you learned so far that has surprised you?
5. Is there anything that we can do to help you with your learning journey?
6. Is there anything else that you would like to share?

APPENDIX D: RETRO QUESTIONNAIRE

1. Overall, how did you like the new experience of learning through a DiG?
    a. I loved it. (If selected, survey automatically takes respondents to Q2)
    b. I liked it. (If selected, survey automatically takes respondents to Q2)
    c. I am not really sure/ I liked some parts. (If selected, survey automatically takes respondents to Q3 a and b.)
    d. I didn’t like it. (If selected, survey automatically takes respondent to Q4)
    e. I hated it. (If selected, survey automatically takes respondent to Q4)
2. Why did you enjoy learning through a DiG?
3. a. What did you like about doing a DiG?

    b. What didn't you like about doing a DiG?
4. Why didn't you like learning through a DiG?
5. As you think about your learning journey, what most surprised you?
6. As you think about your learning journey, what delighted you?
7. As you think about your learning journey, what do you now wonder?
8. Do you have any other ideas of how we might make learning at school a better experience for you?
9. Anything else you would like to share?

APPENDIX E: CHATGPT THEMES

This table represents the collection of themes identified by ChatGPT for each set of responses to each of the questions. The themes have been grouped and one heading chosen for the results.

Personalized Learning	**Group 1**	**Group 2**	**Group 3**
Personalization & Independence Lack of Individualization	Interests & Exploration Or Interest Exploration **Personalization & Relevance**	Project Specific Support Request for Resources Technology Support	Passion & Interests Perceived Lack of Focus on Personal Interests
Learning Skills & Techniques	**Learning Opportunities & Skills Development**	Forced Activities and Feedback	
Time Allocation Lack of Structure Repetitiveness & Unnecessary Activity Desire for Personal Work	**Freedom & Independence** Freedom & Control Individualization and Freedom Time Management	Time Management & Focus Time Management Issues Project Engagement and	Time Management & Duration Perceived Interruptions and Lack of Personalization Perceived Repetitiveness

Time Pace of the Learning Journey	Issues and Interruptions	Time Flexibility	Excessive repetition and lack of variety
Transformative Learning	**Group 1**	**Group 2**	**Group 3**
Deeper Engagement & Enjoyment	Creative Methods & Approaches Creativity and Fun	**Creativity & New Approaches to Learning** Exploration and New Experiences Concerns about Tools and Methods	Positive Changes to Projects Process and Artifacts
Discovery & Self Learning Reflective Thinking	Reflection & Self-Awareness	Reflection & Personal Growth	**Personal Growth & Reflection** Personal Growth & Discovery
Meaningful & Purposeful Learning	Project Complexity & Breadth	Global & Social Issues Impacts on Daily Life	Learning About the World and Personal Interests

Self-Directed Learning	**Group 1**	**Group 2**	**Group 3**
Learning & Knowledge Gain **Unexpected Discoveries in the Research**	General Disconnection or Lack of Interest	Learning About Specific Topics	Cultural Insights Nature/Environmental Insights Sports Realizations
Challenges and Complexity Changes and Adaptations	Confusion & Lack of Clarity	Perceived Lack of Preparation for Future Endeavours	
Connection with Others	Group Dynamics & Advisor Matching	Group Collaboration	Communication Networking **Connections & Broadening Perspectives**

APPENDIX F: STUDENT COMMENTS UNRELATED TO THE DIG

General

“The fact that we are allowed time for physical activity.”

Dislike for certain external communication requirements, such as emailing parents in every stage, "The emails to parents I thought were very unnecessary. People can just talk to their parents about it at home."

Feedback about the classroom environment not always being conducive to learning.

Mention of needing materials not available at school, potentially hindering project progress.

"I also feel as a 10th grader this course did not prepare us for IB."

Students ideas on how we can make school better

"To be more personalized and let us actually learn things we are interested in."

"More freedom to learn in different ways."

"Less examination and more time to learn."

"More freedom and agency."

"I think that the most important part of learning is making it interactive and interesting to ensure teachers have your attention span."

"Make fun activities or add physical activities to your normal schedule."

"Encourage more DIG thinking in the classroom."

"Incorporate the DIG process when we are doing projects for our classes but in a shorter period."

APPENDIX G: LEARNING QUESTIONS FOR EDUCATORS

As you reflect on your time with the students today, what surprised you?

As you reflect on your time with students today, what delighted you?

What do you now wonder?

APPENDIX H: ADAPTIVE SCHOOLS PROCESS REFLECTION

The educators at the school shared this list of insights that emerged from using the Adaptive Schools Process reflection protocol, the details of which have not been shared with the researcher.

What?

Best practice

Best practice (in terms of purposeful personalized learning)

Student voice and choice at the center

Peer listening

Self reflection

what surprised them, what delighted them and what they are wondering about.

Powerful Stories

The DI[G] protocol helps students narrate their learning journey.

I have been hearing a lot of inspiring stories.

Powerful Questions

Guided by powerful questions.

Add On

Feels like an add on in a vacuum (due to learning pathway for PLEx set up totally differently in Feb).

Framework for exploration

Students are exploring, researching, sharing, working on something they are curious about. They keep asking themselves what surprised them, what delighted them and what they are now wondering about.

Students develop intrinsic motivation for learning. They understand the “bigger picture” of their student learning

Finding out who they are

This asks students to dig deep into who they are.

Deep thinking

To answer the what, this is...

- helping students to connect concepts

- reflection

- deep thinking

- provoking

- asking insightful questions

*there seems like less time to work on the projects

A framework for thinking outside the box

Students need a framework to make connection and think outside of the box.

Developing the "why"

Students are understanding WHY they care about things and that leads to greater awareness and motivation.

Develop intrinsic motivation

Students develop intrinsic motivation for learning. They understand the "bigger picture of their student learning.

Process v Product

Students need to see we, as educators, genuinely care about the process more than the product.

one size fits all - does it?

there were some wonderful learning experiences had by many. For those students, this was a rewarding and meaningful experience. What about the others?

Trust

Students must have the feeling that we trusted them in this process, and that they could really follow their passion and interests. It was structured but loose enough to allow each student to explore this journey in a unique way.

Greater Awareness

Students are understanding why they care about things which is leading to greater awareness and motivation.

Taking PLEx into 2023-24

How might we take the elements of PLEx 2023 into next school year?

So What?

Sense of direction

It's helping students connect their project idea with concepts.

Students have a sense of direction.

They are understanding the "why" behind their project.

There is student ownership — self-referenced standards for success.

Helps the brain recognize learning

Neuroscience supports this approach with surprises, delights and wonders.

— Helps the brain recognize learning — Helps it to grow

— Easier to make connections

Learning experiences

...because everyone needs learning to be purposeful, meaningful and relevant. This is how engagement happens and when learning lasts and transfers.

It helps students make strong connections with their learning, deepen the learning experience and make learning more enjoyable and meaningful.

Playful learning framework

We realize that the learning process has many facets. It's not just gulping done knowledge and regurgitating it. It's playing with it.

Student development

Students sustain learning through a long slog. Fewer classroom management issues. More resilience in the face of failure.

Disruption

It gives a framework to encourage independent thinking for students. It seems disruptive for [sic] the "normal" way of teaching.

Supports their passions

This really helps students do something that they are passionate about.

Help!

as with any teaching approach there are pros and cons. Plex can provide much to many...but not all. Is there an opportunity to identify those that are more challenged by this approach and give them different support? This is the role of the educator. Teach the student, not the subject.

Meaningful teaching/learning

PLEx aligns very well with MYP/DP. We need to be more intentional about the language we use and the process we follow to have the right balance between rigor and flexibility.

Let's talk personalised learning

If we believe that in ICS we offer personalised learning, then that was a powerful experience and there are certainly many elements of it that we can transfer to our regular practice in our everyday practice.

Aligning with their future

PLEx is an opportunity to help students really align their interests and passions with the genuine needs and viable career paths in the "real world" whereas traditional classes can sometimes feel (to students) stiff and unrelated to their future. The relevance can be particularly pertinent to them.

Neuroscience!

Latest neuroscience is supporting this approach of surprise, delights and wonders. Highlighting surprises helps the brain recognize learning, helps it to grow and helps students to make connections more easily.

Now What?

MYP [Middle Years Program] connections & time for the process

Explicitly link scramblers of MYP concepts.

Start the process earlier — at the beginning of the year. Maybe two days a month then two weeks at the end of the year. Gives time and space for complex projects.

A wonder

Now that students have embarked on tis [sic] journey, the wonder on this is if the outcome of PLEx will lead them to continue learning and creating beyond PLEx.

More time needed

Giving more time so they can put what they have learned or planned into action.

They have connected, reflected, now if they start implementing that into their project...give them time. As most of the time is being taken by reflection and sharing ideas in a group.

The role of the product

Students need a product to encourage rigor (writing a novel is hard, or at least a chapter). Without a product it really is group therapy.

Could use multiple mini-protocols for a variety of learners.

Student mindset and the DiG

Start the school year with a focus on digging into who they are as students and learners.

DiG and the DP [Diploma Program]/MYP or other courses

A few comments and suggestions from several teachers

1) DP connectives to DiG are relatively easy in Lang & Lit as it is primarily about skills. Students could choose their own texts based on concepts in at least one unit.

2) It would be useful if it's used and experienced in all classes, adapted to t [sic] each subject so that students will deepen their understanding and use of it.

3) This could be integrated with one unit to help create an opportunity where students can focus on what they want to do

Educational Coaches (DiG/MYP)

Hire/create role for Educational Coach to work with all HS teachers on building MYP unites and delivering them

Leadership DiG retreats

ICS leadership team could go through a DiG during their August retreat.

Get all teachers thinking this way.

Teaching coaching

As a HS teaching team, become skilled with best practices with regards to teacher coaching.

Use the language from DiG from Day 1 in the school year.

Share knowledge with each other (teachers to teachers) about how to develop into better teacher coaches.

Integrate DiG (Units/Personal Project)

Integrate DiG into the Personal Project 2024.

Begin using the framework right from the start of a Unit to increase engagement and enrich the experience.

Build a coaching culture

Build a coaching culture at ICS amongst staff. (Meetings, Edu coach)

Team DIGs needed

-Use Mon/Wed meeting times to have staff do their own personalized learning

-Staff DiGs. All HS staff should do DiGs with their teams.

More time

We've had a mixed reaction to DIG (students and teachers). More examples and more time to experience is needed for students to internalize it.

Implement earlier

Find opportunities to use this process earlier.

move forward...

review the process, rene [sic] and go again! Also, there are many learnings to be taken form [sic] this. Is this a stand alone unit? can teachers be guided toward realising and embracing the [benefits]? Can students be shown how this can be integrated into the normal classroom? The entire Plex process felt rushed...Kavita appearing without a proper introduction, not helped by WWW and long weekends!, go go go for the month, briengs [sic] before and after school, slideshow changing daily....is this the best way to deliver a 'new' approach to Plex. Again, overall a great opportunity for many - students and teachers alike. With time this can inuence [sic] education for the better in my opinion. Support, training, research, guidance...can all help create a cultural change. Maybe we can create a more positive learning environment.

Starting small

Where can we immediately start? What are the strategies that teachers can use in their day-today-teaching practices?

Ex. Having a regular check in with students asking their surprises, delights and wonderings as part of “checking for understanding” process. (The frequency of it can be determined by teachers and the nature of the classes)

Embedding the question “What does it mean to you? when projects, units, or concepts are introduced.

Sustainable Minset [sic] shift

How can we ensure that students maintain this mindset shift that has happened over the past few weeks in the next school year? How can we value what happened, highlight some aspects of it and use these experiences to reinforce our teaching of ATLs?

Exemplars?

How can we do a spotlight/feature on the exemplars we want to save for future years? Can we do video or article features?

These can serve as useful resources in the future.

DiGs 4 All!

Have all staff members go through their own DiG experience as learners. This can help to bring departmental teams together with a focus on learning.