

How a Philosophical Approach to Temporal Perception Can Provide a Basis for Developing Useful Strategies for Teaching Art to Students with ADHD

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Abstract: This paper explores research in how students with Attention Deficit Hyperactive Disorder (ADHD) experience temporality. Using a phenomenological lens, the author looks for clues that indicate that students with ADHD sense time differently than those without ADHD and uses the writings on temporality by philosopher Martin Heidegger to underpin the importance of subjectivity in temporal perception. Her goal is to establish a philosophical framework for developing practical approaches to teaching art to secondary students that address the difference in temporal perception of students with ADHD in an effort to create a more inclusive learning environment.

Keywords: Attention Deficit Hyperactive Disorder; time perception; phenomenology; Dasein; dopamine; temporal processing; active art

Introduction

It is generally accepted that time is a way by which we measure our lives and perhaps even our personal achievements. Yet, an individual's experience of time appears to be subjective. In a secondary art classroom where students are occupied with a creative task, if one were to ask the students how long they had spent working on the project that day, there would likely be as many different answers as students in the room. Since time for artistic creation in a secondary art class is limited, a student's inner awareness of the passing of time may affect her participation and sense of achievement. For example, completing a project to one's own satisfaction may be effected by processing speed or "how quickly things can be done" (Ptacek et al., 2019, p. 3921), an ongoing challenge during creative activities in art class. In a related way, the decision making required to complete a creative project may involve "the capacity to estimate the duration of a future task" (Grondin, 2010, p. 562) or assessing how long each artistic process, like cutting or pasting, will take. In this case, temporal perception may involve recognizing how much time is left within the class according to one's "internal clock" and determining if there was time to finish. However, if a student's perception of the passing of time differs significantly to everyone else's, how could one's distorted perception of time affect individual performance or the perception of one's own artistic ability? "A lower precision in time perception might likely imply more significant problems in planning and managing time encountered in everyday life" (Zheng et. al., 2022, p. 277). This concern prompted this author to research differences in temporal perception for individuals with ADHD in an effort to find practical ways to assist ADHD learners during art class and create a more temporally inclusive environment. With a phenomenological lens, the philosophical writings

of Martin Heidegger in *Being and Time* and *The Concept of Time* were used to shed light on the unique temporal perception of students with ADHD in order to determine ways to help them make art in what Heidegger would term, “the now” (1992, p.5E).

ADHD Hinders Artistic Progress

Students with Attention-Deficit Hyperactive Disorder (ADHD) are a particular group whose progress is hindered by “inattentiveness, hyperactivity, and impulsivity” (Weissenberger et al., 2021, p.1). Vargas et al. (2002) believe that “their failure to attend may be even more evident in art. That is, even though students with ADHD might have considerable interest or skill in art, they appear to present considerable management problems to art educators” (p.159) who report little success in developing strategies that work for students with ADHD and feel reluctance at attempting new ones. In the art room, problems relating to self-control and impulsivity can result in little creative work being finished because substantial amounts of time are spent off task which can also disrupt concentration on the art process for others. Students whose work remains undeveloped do not experience feelings of mastery and competency that come from witnessing their own accomplishments as their classmates do when they produce satisfying, finished work. In addition, they may not benefit from the calmness or repose offered by moments of absorption in the creative process for such moments of intense focus during creative activities can result in the joy of realizing one’s own potential (May, 1975). In fact, when it comes to both creative endeavors and day to day living, “attention is our most important tool in the task of improving the quality of experience” (Csikszentmihalyi, 1990, p. 33). Zheng et al. (2022) point out that while an internal timing mechanism within the brain is essential to the experience of time, individual who have ADHD related attention problems might be more susceptible to the influence of external stimuli in time perception. Furthermore, a significant part of the teacher-student dialogue according to Streb (1984) is that the teacher is able to assist the student in overcoming obstacles that he or she faces. In the case of students with ADHD, while hyperactivity, impulsivity, and inattention are key challenges that require further support from the art educator, they are difficulties which may be neurologically linked to students’ inner perceptions of time, causing them to feel that they are temporally behind the rest of the class. As such, students with ADHD may be confronted with time constraints to which they cannot naturally conform.

Are We Ourselves Time? A Philosophical Approach to Time Perception

Philosophers within the Western tradition have related the experience of time passing to an internal feeling of the self or an individual construct that depends upon one’s motivation, affect, and perseverance in any given situation (Wittmann, 2009). Within phenomenological philosophy, Martin Heidegger described the individual subjective reading of time in his work, *The Concept of Time*, by asking how time relates to the existence of human life. He inquires, “What is the now? Is the now at my disposal? Am I the now? Is every other person the now? Then time would indeed be I myself, and every other person would be time. And in our being with one another we would be time” (Heidegger, 1992, p. 5E). His contemplation of the passing of time leads him to the work of theologian and philosopher, St. Augustine. He paraphrases the words of St. Augustine in saying, “In you my spirit, I measure times; you I measure, as I measure time” (Heidegger, 1992, p. 6E). This interpretation emphasizes “that time is a construction of the self. Perceived time, thereafter,

represents the mental status of the beholder” (Wittmann, 2009, p. 1955); time and the awareness of the Self seem to be inseparable. Such discourse suggests that the experience of time or the passing of time is individual, circumstantial, and constantly changing. In a sense, Heidegger suggests that we all go through life ‘in our own time.’ This reasoning rests on the Dasein or “*being-in-the-world*” (Heidegger, 1992, p. 7E); Dasein centers on the certainty of death which causes humanity to be conscious of time. Each of us lives the measure of time and our finality makes us conditioned to live with the awareness of time during all of our emotional states throughout our entire lives. This awareness of time seems to be a condition of being human. We feel that we lose time, we have no time, and at times we anticipate the future, yet even when we exist together in time, it seems we cannot fully share each other’s awareness of temporal experience.

Heidegger’s concept of time is “the horizon for the understanding of being” (p. 39). This Dasein or being-in-the-world is explored further in his work, *Being and Time* where he searches for the meaning of being and explores the idea of truth in being (Heidegger, 1991). To this art educator, his words point to the phenomenology of art experience. Streb (1984) distinguishes that Heidegger’s being-in-the-world is also being-in-the-world-for-others and identifies that for creative individuals these ways of being form both a question and a theme, respectively. He suggests that the creative individual, in this case, the student, uses creative activities to unify experience and that in doing so preserves the experience for herself and others. In this way, art may become the mode by which experience is identified, recorded, and reflected upon. It is, therefore, an enriching experience that one would benefit most from by maintaining focus; art may have no personal meaning without this focus.

In recent years, the philosophical views of phenomenology have given way to studies in cognition and neurology (Weissenberger et al., 2019). When creative individuals focus on their own art making, they may lose track of time. As engagement of the senses is married with skill, creators are stimulated by their ideas, and the sensory experience that art offers attunes to the creative encounter (May, 1975). The nature of the art experience is to achieve the level of engagement or flow which leads to “increasing complexity and growth in consciousness” (Csikszentmihalyi, 1997, p. 32). In the secondary art class, the acquisition of new skills may not be possible for those with attention deficits unless their individual sense of time is accommodated, and they are encouraged to practice strategies to sustain attention. Within the art room, students with ADHD may not be able to achieve the ideal state of creative flow, but teachers who work with them may be able to help them extend their level of engagement if they understand their own role as educators in establishing time-related cues.

As more is understood about the brain and human cognition, the concept of time perception becomes more defined by behaviour. Weissenberger et al. (2021) define “time perception [as] the subjective experience of the passage of time and the process of arranging one’s life according to an inner cognitive clock” (p. 2). This concept of an inner clock may be what Heidegger refers to when he speaks of measuring time by spirit. A common example of time perception that is relatable to most people is the way that time passes slowly during routine activities and quickly during novel ones (Wittmann, 2009, p. 1956). While this example appropriately illustrates how time perception varies according to individual experience, the idea of differences in an inner sense of time may shed light on how students with attention deficits experience temporality within the creative experience of art education. Temporal perception may need to be regarded as a possible deficit or challenge so that students with ADHD can be supported

by teaching approaches that help them feel like they are working harmoniously with the rest of the class.

Although attempts have been made to locate the source of time perception in the brain, the neurological pathways by which humans perceive time are not completely understood (Craig, 2009). In a review on timing and time perception research, Grondin (2010) reveals that within the vast amount of current literature in time processing and time perception “some studies in experimental psychology have emphasized how the temporal structure of events determines our perception of the world” (p. 561). McGee et al. (2004) noted an impairment in retrospective time estimation in ADHD children who seemed to overestimate the length of time an activity took and suggest that this inaccurate perception of time could potentially affect motivation to complete school activities such as homework. In relation to the teaching environment, understanding how students with ADHD perceive time may shed light on strategies for extending focus and attention.

Am I The Now? The Link Between Dopamine, ADHD, and Temporal Perception

Heidegger (1991) identifies that “Time must be brought to light—and genuinely conceived— as the horizon for all understanding of Being” (p. 39). Regardless of how it is understood, it may be the factor which most defines human existence because of our mortality. Yet, time perception may not be well understood.

While Attention-Deficit/Hyperactivity Disorder is one of the most common diagnoses for children and adolescents with behavior disorders (Pontifex et al., 2014), the neurotransmitter, dopamine, has been identified as a contributing factor to this condition (Rubia et al., 2009; Kempadoo et al., 2016). Almarode and Almarode (2008) reported that dopamine, crucial for individuals to perform a variety of different functions including learning tasks, is produced in the midbrain, and is most highly associated with rewards and good feelings. Because it can increase our ability to hold information in working memory longer, increased levels of dopamine can improve memory, attention, and problem solving (Almarode & Almarode, 2008) which are all intrinsic to the act of learning; however, a dopamine dysfunction was found to be the probable cause for deficits in timing function (Rubia et al., 1924).

When students with ADHD act impulsively or have difficulty maintaining focus, their actions may relate to the need to produce more dopamine, but they may also relate to temporal perception (Ptacek et al., 2019). Weissenberger et al. (2021) identifies time perception as a unique symptom of ADHD, one that affects neurological pathways and influences executive functioning or the ability to plan, prioritize, and make decisions. In his study, Weissenberger et al. (2021) identified “definitive anomalies in adults with respect to time perception that were similar to those seen in children”(p. 2). Similarly, Rubia et al. (2009), found that for students with ADHD, the internal sense of time passing may be disrupted within the network of the brain. Since Weissenberger et al. (2021) found that “individuals diagnosed with ADHD primarily as children appear to be responding to a more rapid ‘inner clock’ and thus have the tendency to be inaccurate and to display impulsive behaviors” (p.2), it is likely that time perception plays a role in students’ reactions to situations within the educational setting more than most people realize. Perhaps most teachers are not aware of the root of such impulsivity and only see it as a teaching challenge.

This research suggests that temporal perception is an area of concern that needs to be addressed within the educational setting because parts of the brain affected by ADHD are also associated with the portions that are involved in time perception (Ptacek et al., 2019). Individuals

with ADHD have unequal pairings of dopamine production and receptor sites that receive dopamine, affecting perceptions of time and space (Weissenberger et al., 2021). Rubia et al. (2009) point out that a lag in maturation can be seen in the neuropathology of ADHD and it is likely that these neurological abnormalities relate to a timing disturbance. Further to this, dysfunction in temporal perception occurs, according to Rubia et al. (2009), in three time-related areas: motor timing, time perception in relation to the passing of time, and temporal foresight and temporal discounting. Most recently, Zheng et al. (2022) found that children and adolescents with ADHD performed with less accuracy in judging time intervals than their non-ADHD counterparts and that the hypothesized faster internal clock could cause ADHD students to perceive time spans as longer than they actually were.

If a student's neurological scaffolding does not support the proper discrimination of time, it may be difficult for her to assess how much time has passed or even what a certain amount of time would feel like, so time estimation would be very difficult. Certainly, the student's perception of time or time sense would be very different from everyone else's. In fact, it may feel like being in a time void where one would have to look around for visual cues to stay in sync with the rest of the class. American existential psychologist, Rollo May (1975), points out that "anxiety comes from not being able to know the world you're in, [and] not being able to orient yourself in your own existence" (p. 61). Rubia et al. (2009) identify that "a reduced tolerance to the passage of time is also reflected in other behaviours of those with ADHD such as a 'lack of patience' and 'increased thresholds of boredom'" (p. 1919). They identify that "abnormalities in timing functions are fundamental to impulsiveness" (p. 1919). These may be typical behaviours in reaction to experiences within an art class, yet most educators may be unaware of the root of these behaviours. Ptacek et al. (2019) "believe that, worldwide, educators could significantly help students with ADHD by implementing measures that acknowledge reduced time perception" (p. 3923).

During art class, students are encouraged to engage creatively, ignore distractions, and develop or produce work within the duration of the class; all of these tasks involve an inner discipline, or an awareness related to time sense. True absorption within a creative activity could be likened to states of flow or moments when extraneous material is disregarded because the intention within the act of creating is matched with the level of skill needed to produce the desired result (Csikszentmihalyi, 1990). Because it is unlikely that students with ADHD will experience flow, strategies for teaching art to students with ADHD may require teaching them adaptive behaviors such as taking movement breaks and taking mental breaks so that their inner clocks can embrace the productive current of time in each art lesson like the rest of the class.

While all educators could be more aware of temporal perception in students with ADHD, in creative activities like drawing and painting where some students can "lose themselves" in activities and experience a sense of timelessness, the situation may become more complicated. In relation to Heidegger's concept of Dasein, it may be difficult 'being-in-the-world' while feeling like time is speeding up. Art educators may choose to consider that impulsivity, off-task behavior, and inattention are predictable responses of students with ADHD who feel that they need to "catch up" to everyone else. Thus, such off-task behaviours are indicative of a need for strategies which engage those with different perceptions of time with the lesson and Martin Heidegger's writings about time and human experience illuminate the challenge of teaching those with distorted temporal perception.

Being-In-The-World: Clues for Teachers Working with Students with ADHD

Heidegger's definition of Dasein emphasizes the Being or existence from day to day. It is noted that this existence centers on how people are within the context of the world or environment around them. Thus, an element of Dasein may be interacting with others, making, or creating. Heidegger (1991) states,

When one is wholly devoted to something and 'really' busies oneself with it, one does not do so just alongside the work itself, or alongside the tool, or alongside both of them 'together'. ...A specific kind of forgetting is constitutive for letting something be involved. The Self must forget itself if, lost in the world of equipment, it is to be able actually to go to work. (p. 405)

It is this particular kind of attention that allows students to become immersed in creative activities in the art classroom. Being curious about the qualities of natural forms, experimenting with art materials, and sketching out ideas may be some ways that students may show such focus of attention.

Among the most common difficulties for art educators who work with students that have ADHD is the students' short attention span (Vargas et al., 2002). In a study whose major purpose was to assess responses of students who were being coached to focus their attention on the essential components of art history images, researchers measured response time and the number of glances of students with and without ADHD. Vargas et al. (2002) found that response time for rating art history images was shorter for ADHD and that ADHD students took fewer glances at the artwork. They determined that response times were the longest for semi-abstract work over abstract and realistic painting images. The findings of this study suggest that "students with (ADHD) prefer novelty and attend to salient features of stimuli while disregarding other neutral, detailed, and often informative features of complex stimuli" (Vargas et al., 2002, p. 158). For art educators, the findings may suggest a need for variety in the art history activities presented and that the choices of visual examples in art history images need to be compelling, thought-provoking, and limited to a small number. In addition, students with ADHD need strategies to help them process complex visual information within a short period of time. Vargas et al. (2002) indicate that "the implications for clinical practice and art education are that reducing the initial complexity of visual input could help students with ADHD, especially when the stimulus field or task is complex/difficult or when the children are young, learning disabled, or from a second language culture" (p. 172).

In addition, processing speed or how quickly tasks can be accomplished has been identified as another aspect of temporal perception that is affected in those with ADHD. Ptacek et al. (2019) cite a significant study of children and adolescents who demonstrated a notably lower processing speed in a variety of activities that required either verbal or motor output. Lee & Yang (2019) identified research demonstrating that students with a low capacity for working memory "tend to lose focus or daydream" (p. 30) during classroom learning. Since ADHD affects executive functioning and planning, how art educators break down long-term projects into smaller steps may result in a project's completion for ADHD students by helping them focus on portions incrementally, thus reducing the stress from planning and decision making. In addition, this study may indicate that such strategies as sharing timelines for completion and setting goals for project work lesson by lesson is intrinsic to working with students who have ADHD.

Being With: Limiting Visual Stimuli and Using Temporal Cues

In the case of being-in-the-world, Heidegger (1991) states, “the world is always the one that I share with Others” (p. 155). Sharing space and time within the creative environment of the art room will probably mean students will create at different paces and respond to the art activities and environment with a different sense of time. Art teachers may expect that distractions are likely to occur within any class, and they may find positive ways to shape the environment to reduce distractions and promote focused attention.

While many accommodations are made for students with a variety of learning challenges, Shillingford-Butler & Theodore (2013) identify that for students with ADHD giving extra time to complete assignments is among the most common evidence-based classroom management strategies for students who are slow to make progress in completing work due to attention difficulties. While giving extra time is a worthwhile strategy, within the art room, other strategies may be more inclusive and motivational if they allow students with ADHD to remain on task with the rest of the class.

Since ADHD students spend less time looking at imagery, reducing the number of visual examples could help students with ADHD to maintain focus (Vargas et al., 2002). Certainly, the tendency for ADHD students to “be constantly shifting their focus of attention and searching for more stimulating objects and events in the surroundings [could cause] more attentional pulses and consequently [perceive] time as longer” (Zheng et. al., 2022, p. 276). In relation to this, Sisterhen McAllister (2012) notes that the teaching area should be cleared of any excess materials that are unrelated to the lesson. Removing such objects reduces distractions and temptation as does removing extraneous writing from the board or reducing visual stimulus at the front of the classroom. When an activity demands close scrutiny of a visual image such as a diagram, an example of a technique, or an art history image, it is likely that any so-called extra material will complicate the need to focus. Similarly, only relevant physical items such as equipment or art materials required for the lesson should be left within reach to avoid the scrutiny of busy hands.

Also, strategies which use time-related cues that give students the ability to predetermine how long an activity will take are useful in helping them keep focused. One example of a time-related cue is listing the order of events for the lesson. This information can be written as a checklist or visual agenda that gets checked off when each activity is completed. Sisterhen McAllister (2012) indicates that such advance organizers can help students with ADHD form more efficient neural networks by providing them with a framework for perceiving the materials presented in relation to one and other, and the ability to predict the order of events can help students feel more comfortable. Since a relaxed disposition is useful when engaging in creative activities, time-related cues may help to provide an atmosphere conducive to art making.

Other activities involving time-related cues are timed contour drawing exercises for improving observational drawing skill of still life objects. Art educators can distinguish time limits of one to fifteen minutes and increase the duration of the drawing over a number of lessons. Sharing how much time has passed may help ADHD students stay in temporal harmony and maintain focus because they know how long they have to stay on task. The key benefit of sharing time-related cues is that students develop assurance when they know what will come next. This may give them confidence that they will be working at the same pace as others. While students will probably feel the need to explore the tactile qualities of still life objects set before them on the table, such exploration and appropriate handling of objects is encouraged in relation to the observational

drawing activities because they are engaged and learning about the object's texture, shape, and size which can help during drawing exercises. Tactile exploration can be encouraged as the basis of another drawing exercise by having students close their eyes and draw with their dominant hand while the non-dominant hand searches for details of the object's dimensions, texture, and character.

Energizers or Walkabouts

Almarode and Almarode (2008) use neuroscience research to plan lessons in line with the built-in limitations of the brain that prevent it from being overloaded with information. Their research indicates that the student brain can focus for a maximum of fifteen minutes before becoming distracted and that it can process three to four pieces of information at one time. In art class, this temporal framework would allow for a short introduction of the elements of art and design, a studio technique demonstration, or a brief discussion of symbols found in an art history image. Because it is often within the span of the working studio activity that students with ADHD become distracted while developing their art, the use of energizers or short activities up to three minutes in duration can provide a mental break. Physical movement causes an increase in dopamine and norepinephrine levels which will increase blood, oxygen, and glucose levels creating a feeling of mental refreshment (Almarode & Almarode, 2008). Such planned short breaks allow students' brains to readily process more information.

During art class, "walkabouts" of up to three minutes can give students the opportunity to walk around the room and explore their classmates' responses to the art directive or project. As students may learn from each other's visual responses, this is a valuable time for them to compare drawing approaches and to learn a variety of stylistic techniques and methods from their classmates. At the same time, students' brains are given a break so that they can return to their own work refreshed, with a sense of objectivity about what to do next. Such techniques may even help students to resolve unfinished areas of a project with a higher level of engagement if they have seen an approach that they can integrate into their own work. Announcing that the walkabout will occur at a specific time may cause students to be less likely to move impulsively from their own seats if they know that a movement break is imminent. For students with attention deficits, being able to predict what will happen during the class may help them to feel more connected to the activities and more internally motivated.

Active Art

Dopamine production presents a unique avenue for developing strategic art activities that may benefit students with ADHD. In this case, the movement required in the physical production of the art may be useful in facilitating dopamine production (Almarode and Almarode, 2008). In addition, drawing or painting outside from nature while incorporating periods of movement may influence time perception in a positive way (Weissenberger et al. 2019). To help students with ADHD extend their attention with the rest of the class, art educators can choose to use *active art* as a means for personal creative involvement. Active art could include any activities which require simple physical movements to develop the artistic directives that result in the production of artwork such as standing, holding short poses, or walking from one area of the room to another.

Active art could involve moving from station to station to perform different activities, such as those required in the process of printmaking. Moving from one table to another to carve a

printing plate, to ink the plate, and finally to print it, may offer the desired amounts of movement for students with ADHD balanced with the necessary focused work required for artistic expression. Similarly, working at an easel allows for a more focused approach to art making while normalizing a certain amount of standing and movement during the class. In addition, posing for the class during timed gesture drawings or striking the poses visible in art history works may help students with ADHD to produce dopamine while becoming more engaged with the rest of the class, and feeling less restricted than when they are working in their seats.

Techniques to Promote Individual Focus

Varying the approaches used to produce art may help to create novel experiences for students. For example, changes in routines, art processes, techniques, and materials can offer a refreshing outlook to art making which may help to increase individual focus. Since Vargas et al. (2002) indicated that novelty is a preference for students with ADHD, art techniques that involve reasonably quick completion times such as those which may be finished within an hour may help to make results attainable. Similarly, working on a small scale may help to increase levels of individual focus. For example, working step-by-step with the art teacher to produce small optical illusions approximately 5" x 5", could offer a slightly longer focus of attention and ensure an immediate reward since the results of the student's efforts would soon be visible within the drawing. Working on a smaller pictorial surface may increase the intimacy of the creative encounter and help students narrow their field of attention.

Another approach to focusing attention may come from sensory experience. Listening to nature sounds while drawing forests from varying distances or differing points of view may help to create a soothing environment and to sustain an inner sense of focus on an imagined scene. Students may be prompted to consider the artist's point of view while looking at specific works of landscape artists such as Emily Carr or Tom Thomson and be invited to imagine themselves in different landscapes at various distances from a forest.

Conclusion

While both attention and temporal perception vary from student to student, temporal perception is an area of concern that requires further consideration for art educators who teach students with ADHD. In fact, it is becoming apparent that the inner perception of time is a fundamental feature of ADHD and one that may be an individual difference that art educators could more successfully accommodate within the context of the art lesson. In reflecting on how to approach this symptom which may block student progress, the phenomenological writings on time perception by Martin Heidegger reveal how individual and unique the human experience of time is. Contemplating a philosophical approach to time perception is useful because it is a difference that is not immediately visible during the students' interactions in a classroom environment. Yet, understanding that people with ADHD experience time differently may help art teachers to adapt ways of keeping students with ADHD in temporal harmony with the rest of the class during creative activities. In addition, it may help art educators to respond more empathetically and understand the influence perception of time can have on behaviour, thoughts, actions, and emotions. Through our humanity, we share the consciousness of the passing of time, yet time discrimination and estimation can be inaccurate for those students with ADHD due to deficits within the neurological scaffolding of the midbrain making their situation of being-in-the-world

truly challenging. This issue may explain some off-task behaviour during art class, particularly if the student with ADHD is comparing herself to other students. Since art making is an activity that requires sustained attention and focus, it is recommended that art educators consider ways of incorporating time-related cues so that students with ADHD can predict what will happen next, stay attentive to the various aspects of the lesson, and experience temporal harmony with the rest of the class. In addition, limiting physical distractions within the learning environment as well as reducing teachable concepts and factual information may help students with ADHD to maintain their focus. As ADHD is a condition related to a lack of dopamine production, including active art or physical movement in a variety of ways within the art activity may help to produce dopamine which, in turn, can generate greater focus. Such periods of movement may be simple, short, and relevant to the lesson. Offering a varied and stimulating art program with time to work outside blended with opportunities for close, scrupulous work on a small scale may help to give students with ADHD a rewarding experience that gives them a sense of achievement, pleasure, and competency while respecting their unique inner experience of time. Certainly, the role of the art educator can be to help such individuals experience art making as fully lived within the span of time it is offered so that these students may recognize the possibilities of being. As Heidegger (1991) states, “Time must be brought to light - and genuinely conceived – as the horizon for all understanding of Being and for any way of interpreting it” (p. 39).

References

- Almarode, J., & Almarode, D. (2008). Energizing students: Maximizing student attention and engagement in the science classroom. *The Science Teacher*, 75(9), 32–35.
<http://www.jstor.org/stable/24144164>
- Craig, A.D. (2009). Emotional moments across time: A possible neural basis for time perception in the anterior insula. *Philosophical Transactions: Biological Sciences*, 364(1525), 1933–1942. <http://www.jstor.org/stable/40485969>
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper Perennial Modern Classics.
- Grondin, S. (2010). Timing and time perception: A review of recent behavioral and neuroscience findings and theoretical directions. *The Psychonomic Society*, 72(3), 561–582.
<https://doi.org/10.3758/APP.72.3.561>
- Heidegger, M. (1992). *The concept of time*. (W. McNeill, Trans.). Blackwell Publishing. (Original work published 1924).
- Heidegger, M. (1991). *Being and time*. (W. McNeill, Trans.). Blackwell Publishing. (Original work published 1927).
- Kempadoo, K., Mosharov, E., Choi, S. J., Sulzer, D., & Kandel, E. (2016). Dopamine release from the locus coeruleus to the dorsal hippocampus promotes spatial learning and memory. *Proceedings of the National Academy of Sciences of the United States of America*, 113(51), 14835–14840. <https://doi.org/10.1073/pnas.1616515114>
- Kumari, L., & Chhikara, S. (1995). Adaptive behaviour of children and related factors. *Hitotsubashi Journal of Social Studies*, 27(1), 91–96.
<https://www.jstor.org/stable/43294372>

- Lee, H.-Y., & Yang, E.L. (2019). Exploring the effects of working memory on time perception in attention deficit hyperactivity disorder. *Psychological Reports, 122*(1), 23–35. <https://doi.org/10.1177/0033294118755674>
- May, R. (1975). *The courage to create*. Bantam Books.
- McGee, R., Brodeur, D., Symons, D., Andrade, B., & Fahie, C. (2004). Time perception: Does it distinguish ADHD and RD children in a clinical sample? *Journal of Abnormal Child Psychology, 32*(5), 481–490. <https://doi: 10.1023/b:jacp.0000037778.61929.1b>
- Paton, J., Soares, S., & Atallah, B.V. (2016). Midbrain dopamine neurons control judgment of time. *Science, 354*(6317), 1273–1277. <https://science.sciencemag.org/content/354/6317/1273>
- Pontifex, M. B., Fine, J. G., da Cruz, K., Parks, A. C., & Smith, A. L. (2014). The role of physical activity in reducing barriers to learning in children with developmental disorders. *Monographs of the Society for Research in Child Development, 79*(4), 93–118. <http://www.jstor.org/stable/43773274>
- Ptacek, R., Weissenberger, S., Braaten, E., Klicperova-Baker, M., Goets, M., Raboch, J., Vnukova, M., & Stefano, G., (2019). Clinical implications of the perception of time in attention deficit hyperactivity disorder (ADHD). *Medical Science Monitor, 25*, 3918–1924. <https://doi.org/10.12659%2FMSM.914225>
- Rubia, K., Halari, R., Christakou, A., & Taylor, E. (2009). Impulsiveness as a timing disturbance: Neurocognitive abnormalities in attention-deficit hyperactivity disorder during temporal process and normalization with methylphenidate. *Philosophical Transactions: Biological Sciences, 364*(1525), 1919–1931. <https://doi:10.1098/rstb.2009.0014>
- Shillingford-Butler, A., & Theodore, L. (2013). Students diagnosed with attention deficit hyperactivity disorder: Collaborative strategies for school counselors. *Professional School Counseling, 16*(4), 235–244. <https://www.jstor.org/stable/10.2307/profschocoun.16.4.235>
- Sisterhen McAllister, L. (2012). Strategies for optimal learning with ADHD and hyperactive students. *American Music Teacher, 61*(4), 18-22. <https://www.jstor.org/stable/43540074>
- Sripada, C., Kessler, D., & Angstadt, M. (2014). Lag in the maturation of the brain’s intrinsic functional architecture in attention-deficit/hyperactivity disorder. *Proceedings of the National Academy of Sciences of the United States of America, 111*(39), 14259–14264. <https://www.jstor.org/stable/43055069>
- Streb, J. (1984). Thoughts on phenomenology, education, and art. *Studies in Art Education, 25*(3), 159–166. <https://www.jstor.org/stable/1320697>
- Vargas, A., Zentall, S., & Wilbur, J. (2002). Responses to art attention-training by English and bilingual Spanish-speaking students with and without ADHD. *Studies in Art Education, 43*(2), 158–174. <https://www.jstor.org/stable/1321002>
- Weissenberger, S., Klicperova-Baker, M., Vňuková, M., Raboch, J., & Ptáček, R. (2019). ADHD and time perception: Findings and treatments. *Activitas Nervosa Superior, 61*, 131–135. <https://doi.org/10.1007/s41470-019-00027-2>
- Weissenberger, S., Schonova, K., Büttiker, P., Fazio, R., Vňuková, M., Stefano, G., & Ptáček, R. (2021). Time perception is a focal symptom of attention-deficit/hyperactivity disorder in adults. *Medical Science Monitor, 27*, Article e933766. <https://doi:10.12659/MSM.933766>

- Wittmann, M. (2009). The inner experience of time. *Philosophical Transactions of the Royal Society*, 364, 1955–1967. <https://doi:10.1098/rstb.2009.0003>
- Zheng, Q., Wang, X., Yu Chiu, K., & Kar-man Shum, K. (2022). Time perception deficits in children and adolescents with ADHD: A meta-analysis. *Journal of Attention Disorders*, 26(2), 267–281. <https://doi.org/10.1177/1087054720978557>