

Computer Education in Waldorf Schools

BY CHARLES WEEMS, PhD

When and how should we teach our children about computers, so that they are prepared for the future?

Over the past decade, parents, educators, politicians, and others have been asking this question more frequently, with a growing sense of anxiety and urgency. Organizations such as the National Science Foundation and the Computer Science Teachers Association answer by proposing a program of computer education beginning in kindergarten. Their recommendations are based more on the philosophy that “earlier is better” than on research into the effectiveness and developmental appropriateness of teaching “computational thinking” starting at age five. (Please see box on the next page.)

Because Waldorf Education waits until adolescence to focus on technology, it can seem by comparison to leave children less prepared. But precisely the opposite is true. Success in a time of social upheaval and rapid change depends more on capacities for imagination, creativity, flexibility, artistry, and a love of learning than on earlier development of abstract, logical, and analytical approaches to thinking, or specific technical skills.



In mainstream education, the principle of “the earlier the better” is generally applied to computer learning.



Waldorf ninth graders learning about how images are digitized

In a world where technology fosters frequent interaction between disparate cultures, people need social and multilingual communication skills. The apparent anonymity of the internet, combined with how it enables governments and corporations to track our activities, demands a strong sense of morality and good judgment. And the passivity that can arise from meeting the world increasingly through a screen must be countered by a passion for real experiences and the courage to take action. In Waldorf kindergartens, play builds imagination, creativity, and empathy for others. Art, languages, drama, and practical work in the elementary grades develop not only those skills but also moral and aesthetic senses. High school weaves judgment and volition into college or vocational preparation. Waldorf Education is already working to prepare children to have the resilience and resourcefulness necessary to prosper in a culture that is growing more intertwined with technology.

Consider instead a question that is rarely asked: “What’s the harm in introducing computational thinking before adolescence?” Education research typically works by testing a new technique on a group of children and measuring the improvement. It is much harder to determine what might have been lost in exchange for a gain.

One obvious loss is when new material displaces existing activities. We know children are more flexible for acquiring skills in music, art, movement, and languages prior to adolescence. So diminishing those areas of activity reduces the opportunity to make the most of that period of development.

Some will argue that learning the use of technology is more important. For example, the Common Core recommends that handwriting be replaced with keyboarding after first grade. But we do not know the broader effects of reducing the time spent developing those fine motor skills. And what happens when

Computational thinking (CT) is a problem-solving process that includes, but is not limited to, the following characteristics:*

- Formulating problems in a way that enables one to use a computer and other tools to help solve them
- Logically organizing and analyzing data
- Representing data through abstractions such as models and simulations
- Automating solutions through algorithmic thinking (a series of ordered steps)
- Identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- Generalizing and transferring this problem-solving process to a wide variety of problems

* Operational definition of computational thinking (CT) for K–12 education from the International Society for Technology in Education and the Computer Science Teachers Association, 2011: <https://csta.acm.org/Curriculum/sub/CurrFiles/CompThinkingFlyer.pdf>

we replace the individuation that a child experiences in creating a personal writing style with the uniformity of always seeing his or her words appear in a standard computer font?

Even more difficult to assess is whether training children to think rationally at an early age introduces other deficits. What subtle changes in psychology might result? In the collection of lectures entitled *A Modern Art of Education*, Rudolf Steiner offers an example:

When we train children intellectually before the age of four or five, they take something terrible into life: materialism. The more we raise children intellectually at such an early age, the more we create materialists for later life.¹

By this he means that they become less inclined to place a high value on nonmaterial aspects of life, such as ideals and the human spirit. Steiner also claims that waiting to introduce intellectual thinking until a later stage of development is actually more effective:

Although it is necessary, especially today, for people to be completely awake in later life, it is equally necessary to let children live in their gentle

dreamy experiences as long as possible . . . if you allow the organism to be strengthened without intellectualism, children will move into the necessary intellectualism in the proper way.²

He goes on to say that forcing young children to use intellectual thought too soon is like giving them an inner beating. It can engender resistance to taking it up in later studies. No student should arrive in high school with a preformed self-image that “I’m bad in math and science.” But that is often what we see resulting from well-intentioned efforts to teach those subjects to young children in an intellectual manner.

Regarding children ages nine through twelve, Steiner says,

Nothing is more harmful to children than definitions and sharply contoured ideas, because they lack the quality of growth. . . . A child must be given flexible concepts—ideas whose form constantly changes as they mature.³

The problem Steiner identifies in teaching elementary-age students in terms of facts, data,



Waldorf tenth graders building a binary addition circuit, i.e., a circuit that can add numbers that are expressed in terms of zeros and ones

and set processes is that they learn rigidity in their thinking and come to desire simple answers, rather than gaining confidence in working flexibly with living and evolving concepts.

Expressing a view similar to what the well-known pioneer in the field of child development, Jean Piaget (1896–1980), described in his “formal operational stage,” Steiner says that “before the age of twelve,

children do not understand cause and effect," but that "through coercion" they can be forced to "take it in." He says the effect, however, is like "swallowing a stone."⁴ Needless to say, computational (algorithmic) thinking is largely based on cause and effect.

Evaluating whether delaying the introduction of computational thinking is more effective, or if early introduction causes harm, is nearly impossible. It would require a long-term study, on a large population of students, with a carefully designed assessment. Parents and teachers do not want to wait for the decades such a study would take. There is a sense of crisis that demands immediate action. The easy fix is to start requiring computer use in kindergarten, as recommended by the Common Core.

However, Waldorf Education has nearly a century of experience with teaching children in a manner that accounts for their development. That's a long-term experiment we can analyze in retrospect. For example, a survey undertaken by the Research Institute for Waldorf Education⁵ found that among Waldorf high school graduates from the years 1991 to 2002, 47% chose science and engineering majors versus 32% for the general population. Clearly, a curriculum that delays rigorous, intellectual, science education until high school has not deterred graduates from pursuing such careers. Indeed, it seems to have had just the opposite effect.

My personal experience with teaching computer science in a Waldorf high school for the last fourteen years is that our students are more than able to learn binary arithmetic, digital logic, and programming. Although many of them major in college subjects other than computer science, a surprising number pick up software and web development skills along the way, and are quite fluent with technology.

Because many Waldorf schools end in eighth grade, however, it is easy to perceive Waldorf Education as being opposed to computers. Again, that is far from the truth. Steiner was very insistent that, once children enter adolescence, Waldorf curricula should focus on technology:

People are surrounded by inventions of the human mind, but have no contact at all with them. It is the beginning of an antisocial life simply to accept inventions of the human mind without at least understanding them in a general way. . . . When children are fourteen or fifteen years of age, we



Waldorf twelfth graders comparing the experience of reading the news on a computer screen versus that of reading it in a newspaper

must focus our energy on connecting them with the inventions of the human mind. This helps them understand and find their place in society.⁶

Prior to that age, students should be working on developing their other capacities so they can approach technology from a strong foundation. As Steiner says, "The main thing is to enable young adults to find their place in the world with real confidence in their own powers of discernment. Thus, they will sense their real humanity, because their education has been completely human."⁷

If students enter adolescence with a strong sense of self, they are better prepared to study digital technology objectively. It can then be approached as a tool, like any other, with capabilities and limitations that can be understood. With discernment, it is possible to see through the hyperbole that often surrounds new technologies, to grasp the reality of their effects.

Does this mean that children should be kept in a bubble with respect to computer technology until they are teens? Of course not. Waldorf Education at all ages must work with the real world, and computers are a significant part of modern reality. High school is merely the stage in which it is most effective to focus directly on what computers are, how they work, why they behave as they do, and their effects on humanity.

In kindergarten, children are naturally imitative of the adults around them. They learn fundamental lessons about computers from observing how we interact with them. Children know that adults sometimes need to use cell phones or computers. They should see how we decide when that is appropriate, and understand what we use them for.

For example, kindergarten children might be aware that their teacher always turns off her phone before they arrive because she wants to be wholly attentive to them. But one day, she might say, "Children, I need to keep my phone on because my daughter is about to have a baby, and I don't want to miss that call." The children will then understand that the teacher has consciously made this choice for an important reason.

On the other hand, seeing people spending large amounts of time interacting silently with a screen while ignoring others around them tells young children that this is a socially acceptable behavior. Hearing adults express a lack of understanding of technology also makes it seem impossible to grasp. However, if teachers and parents model mastery and understanding of these devices, then children develop a sense that human beings control them, rather than being controlled by them.

In the elementary years, children look to the teacher as an authority who brings the world into the classroom. Many parents also look to the teacher for guidance with respect to computer use. For those reasons, teachers should be as knowledgeable regarding digital technology and social media as they are about other subjects.

Today's children will face modern challenges such as cyberbullying, internet addiction, violations of privacy, online fraud, and many others. Understanding these issues can inform a teacher's work, from consciously choosing fairy tales and fables that reflect relevant moral lessons in the early grades, to examining internet culture in connection with modern history in eighth grade. Awareness of how personal interactions and experiences of the world are shifting to virtual forms can shape a teacher's efforts to guide social situations, create community, and develop a deep connection to the natural world.

There is much to be done in the preschool, elementary, and middle school years to help children prepare to enter a world of ubiquitous digital technology. Learning computational thinking can wait for the developmental stage in which abstraction and symbolic reasoning come naturally.

Does Waldorf Education really need to change? Absolutely. A living form of education must continually evolve. But as Steiner so often indicated, the approach begins with inner work. Teachers owe it to the children to educate themselves about this aspect of the world, take it into their meditative

lives, discuss it with colleagues and parents, and then bring it intentionally to their teaching in the context of each developmental stage.

Parents can join in this effort by deepening their understanding and reflecting on their own relationships to technology, then engaging each other and the teachers in conversations about what they hope their children will come to value most as they grow up and become computer users.

Steiner identifies the deeper goal of this education, saying, "The real aim of Waldorf schools is to raise free human beings who can direct their own lives."⁸

The question is not when computer education should happen. It already begins shortly after birth, and will inevitably occur as children encounter the world. The question is how we will shape their education to enable them to work with technology in freedom. ☉

Notes

1. Rudolf Steiner, *A Modern Art of Education* (Great Barrington, MA: Anthroposophic Press, 2004), 103.
2. *Ibid.*, 103.
3. *Ibid.*, 131.
4. *Ibid.*, 151.
5. David Mitchell and Douglas Gerwin, *Survey of Waldorf Graduates Phase II* (Wilton, NH: Research Institute for Waldorf Education, 2007)
6. Steiner, 158.
7. *Ibid.*, 190.
8. *Ibid.*, 191.



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