Modern Literacy: Teaching Elementary Students How to Code

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Thesis
The Knox County School district should add coding classes to their elementary school curriculum in order to help its students succeed in the modern world.

Background Analysis
Since the introduction of personal computers, daily life functions have changed significantly. The sheer number of personal computers has grown rapidly, reaching well over two billion globally in the past five years\(^1\). When the printing press was first introduced, there was a mass surge in literacy\(^2\). Likewise, the tremendous amount of information that has become accessible thanks to the internet precedes a change in the knowledge base of the general public. With computer usage as high and frequent as it is, it is important for the next generation to understand how the systems that are so ubiquitous work and how to best utilize them.

As with most other tool sets, computer science is taught best when learned at a young age\(^3\). Given its location and resources, Knox county is in a unique position to initiate the kind of change that should be implemented across the country. The Knox County School District has a budget of nearly four-hundred fifty million\(^4\), with well over 500 computers per school in the district\(^5\). They can easily start implementing a new approach to spreading technological literacy through an elementary computer coding curriculum. That will be implemented to teach problem solving and coding.

Talking Points
- Teaching skills technical that can be used professionally can give opportunities to students who cannot afford higher level education.
- Allowing students to learn about computer programming early on would diversify the students that proceed to learn about the topic in higher education, giving opportunities to underrepresented students\(^6\).
- Programming can teach a variety of general problem solving skills that can be applied in many other fields\(^7\).

Policy Idea
Knox County School District should implement coding classes at the elementary school level. This will be done by teaching introductory “Boolean Logic” in math classes in the first grade. Teaching a class in problem solving using logical expressions and programming inspired games for the 2\(^{nd}\) and 3\(^{rd}\) grade levels. Teaching introductory programming using easy syntax languages such as python in the 4\(^{th}\) and 5\(^{th}\) grade levels. With more in depth and theoretical classes being taught in addition to more complex languages such as C++ and Java in later grades.

KEY FACTS

- Computer systems design is expected to be the 3\(^{rd}\) fastest growing industry for the next decade\(^9\).
- If 1% of female middle school students learned how to code it would be estimated to triple the number of females in the industry\(^10\).
- Half of all high pay jobs in the United States require knowledge of coding\(^11\) and it is expected to increase...
Policy Analysis

Due to the relationship of logical problem solving and programming, this policy would teach lifelong abilities at a young age. Since computer science is taught only in higher level curriculums, there is an exaggerated difference between white male computer science students and students of other racial and gender groups. This policy would support the diversification of opportunity for female children and minority children in Knox County School District by giving them an opportunity to explore a field in which they are members of underrepresented groups.

The implementation of the curriculum will be the only difficulty. One benefit of the implementation by the Knox County School district is their wide range of access to computers in schools. To simplify this Knox County can use some of the many resources available for teaching coding and programming to younger students. These resources include free curriculums and free workshops that are open to all public school teachers by organization such as Code.org.

In addition to benefits to the students and ease of implementation for the district, the program will also benefit Knoxville as a whole. As a growing technological center, it is imperative for schools in the district to teach their students skills that can benefit the city as a whole.

Next Steps

To accomplish all of this the Knox County School district must be lobbied. The School District should be presented with a working version of the curriculum that will be influenced by the University of Tennessee Computer Science Department. The program will be presented to the school board. Pending their approval there will be a campaign to present the policy to students and parents that would explain and help with the transition.

Once classes begin to be taught at the elementary school levels, expanded curriculums should be introduced to upper level grades. Students in middle school and high school would be required to take programming classes with similar levels of complexity as Algebra or Geometry. Additionally, Knox County can work with the University of Tennessee Computer Science department to allow students to have easy access to higher level computer science education resources especially for under privileged students. These classes would involve abstract problem solving, website design, application design and general logical thinking that can be directly applied to the real world. Once Knox County demonstrates the success of this program, it can be used as a model to be implemented at the state level.
End Notes


