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Research Proposal on Ways to Train the Concept of Teaching Computer Science

In recent years, there have been many cases made for and against the idea of having computer science as one of the core subjects in the K-12 curriculum. In January of 2016, Barack Obama launched the "Computer Science for All" initiative which was meant to mitigate the problem of schools not having enough funding to train and hire computer science teachers. However, another problem existed in the fact that teachers just did not have the motivation to teach or learn computer science even if they were trained with the funding received. To help alleviate this issue, the type of people that should be teaching computer science to students from kindergarten to high school are people who already have an adequate amount of expertise in computer science and can still be trained to teach instead of having to learn the material by force. As a result, one proposal I would like to present is to conduct research on effective ways to have computer science students and graduates be passionate about teaching the subject to younger students in various age ranges. Not only will this weed out teachers who have no interest in learning about computer science, but it will also provide a reliable way in introducing more teachers into the workforce that specialize in subjects they will be well-informed at, as well as giving students more choices for their career paths.

It has already been established that computer science in the curriculum will net positive results since it will lead to a breakthrough of individuals with stronger problem-solving skills and sharper mindsets when finding solutions. Vinton G. Cerf, the vice president at Google who is also known as one of the founding fathers of the Internet, stated in an article back in March 2016 that computer science as a whole is all about analyzing problems and finding results by breaking down the problems into small, manageable parts, all of which are invaluable skillsets and thinking strategies that apply to a plethora of different fields such as business, engineering, and even politics.[1] In addition, based on an excerpt from an article written in July 2016 by University of Tasmania computer science professor Andrew Fluck and other professors around the world, the world is driven by technology and so the economic and social demand for individuals with experience and ambition in the field continue to grow for many industries around the world.[2] Both articles are connected in the bigger picture since they discuss the importance of the effects of teaching computer science to a younger audience and the net positive results it will yield.

However, the problem therein lies with the lack of resources and teachers willing enough to teach computer science below college level. From an article written in September 2013 by German computer science professors Maria Knobelsdorf and Jan Vahrenhold from the University of Hamburg and University of Münster respectively, not a lot of teachers are attracted or drawn in to the subject despite already having rigorous and effective Computer Science teacher training programs across the world, leading to schools recruiting professionals that are not qualified to

[1] Cerf, Vinton G, "Computer Science in the Curriculum," Communications of the ACM, vol. 59, no. 3, 25 Mar. 2016, pp. 7–7., doi:10.1145/2889282.
[2] Fluck, Andrew, et al, "Arguing for Computer Science in the School Curriculum," Journal of Educational Technology & Society, vol. 19, no. 3, July 2016, pp. 38–46., eds.a.ebscohost.com.proxy.library.stonybrook.edu/ehost/pdfviewer/pdfviewer?vid=1&sid=40065b08-0844-41c1-b353-8ff6e35ee931%40sessionmgr4008.

teach computer science.[3] Adding on to this, computer science professor Mark Guzdial from the School of Interactive Computing at Georgia Institute of Technology stated in an article back in August 2014 that the addition of computer science in the curriculum would only do more harm than good to the US's educational system since it would result in current teachers not having any idea as to what they should be teaching and testing students.[4] These two articles are connected since they all come back to the general idea that there are not enough teachers teaching or are willing to teach computer science to new students, and because of this, the need of including computer science in the curriculum becomes more abstract. Lastly, from an article written in August 2017 by Jennifer Wang, the Research Program Manager on Google's Computer Science Education Team, many schools did not offer computer science classes because there was a lack of qualified teachers needed to teach the course as well as lack of funding from the schools needed to train these teachers in the field of computer science.[5] Although funding is an issue since teaching computer science to students has to be a well-sustainable occupation for many professionals, it becomes meaningless if there are no teachers worth hiring. The question that needs to be asked then is: How can we increase the number of teachers that are inclined on teaching computer science towards K-12 students?

Because of these underlying issues, I propose conducting a research on how young adults, specifically college students majoring in Computer Science, can effectively be persuaded to teach computer science to younger students. One way that this can be examined is by having these college undergraduates or graduates become TAs, or teaching assistants, in local primary schools

[3] Knobelsdorf, Maria, and Jan Vahrenhold, "Addressing the Full Range of Students: Challenges in K-12 Computer Science Education," Computer, vol. 46, no. 9, Sept. 2013, pp. 32–37., doi:10.1109/MC.2013.263.
[4] Guzdial, Mark, "Why the U.S. is Not Ready for Mandatory CS Education," Communications of the ACM, vol. 57, no. 8, 1 Aug. 2014, pp. 8–9., doi:10.1145/2632036.
[5] Wang, Jennifer, "Is the U.S. Education System Ready for CS for All?," Communications of the ACM, vol. 60, no. 8, 24 Aug. 2017, pp. 26–28., doi:10.1145/3108928.

for an entire semester in order for them to have some experience and exposure in how to teach children a new subject. This can be done by recruiting these college students in career fairs or recruitment centers and giving them incentive such as college credits in order to convince them into taking the positions. Another way this can be conducted is by introducing courses or electives in universities that tailor towards guiding college students on how to teach younger students computer science. Even though the idea of introducing a new course to a college is difficult enough in itself since more professors would be needed to teach the course, it would still remove the factor of forcing people to teach a subject that they would not be interested in teaching at all. If the students do take course and become well-versed in teaching the subject, then it would help schools find teachers much faster since they would be hiring individuals that already know how to teach for younger audiences.

If this research proposal were to be carried out, it would inevitably increase the number of potential teachers that would be recruited for specialization in computer science. It would alleviate the issue of a lack of teachers in the field, and with this, funding of schools can be utilized accordingly to hire more outstanding candidates. As a result, with more trained teachers for computer science, students will be able to learn more effectively, which could lead to most of these students taking the path of being computer science majors in college and potentially increasing the market demands of people in the IT industry.

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