Expanding Computer Science Learning Opportunities in K-12 Instruction in Virginia Schools

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Motivation of Study
- CS Jobs are the number 1 source of all new wages in the U.S.¹
- VA had 29,924 open computing jobs per month in 2022, with average salary $106,580².
- However, only 53% of U.S. high schools teach at least one CS course in 2022¹.
- Integration and expansion of CS Learning is vital for VA economy. Hence, VA adopted CS Standards of Learning (SoL) in 2017.
- Code.org, an advocate for CS education, offers 9 metrics to make CS fundamental in K-12 education.
- This study analyzes the implementation of the SoL in VA Schools, as well as progress of VA in code.org metrics.

Methodology and Dataset
- **D1: Enrollment and SoL Implementation**
  - No. of Students enrolled, per course title, per school
  - Years 2021-23, Source VDoE
  - Schools in D1 cross-referenced with Virginia School Directories (VSD), from VDoE. Provides district ID, county, school type (e.g. High) for each school.
  - County cross-referenced with implementation phase status (e.g. beginning to plan) reported to VDoE.
  - We assign each school with their superintendent regions from VSD, and finally implementation status.

- **D2: Code.org State Tracker**
  - Yes/No per state per metric of CS education
  - All 9 metrics are listed at code.org³.
  - Source Code.org⁴

- **D3: Salary Data**
  - Source: US Bureau of Labor and Statistics, 2022
  - High/Middle school salaries are based on the job label ‘Career/Technical Education Teachers’.
  - Elementary school salary is based on the job label ‘Elementary School Teachers, Except Special Education’.

CS Standards of Learning Implementation
- 94.77% of High and Middle schools offer at least one CS course.
- Total number of schools offering a CS course is increasing each year.
- At the current average rate of increase of 4.94%, full implementation across all VA schools including all Elementary, Middle, High, Combined and Virtual schools. will take at least 19 years
- 4/8 Superintendent regions have majority of High and Middle schools in ‘beginning’ or ‘full’ implementation phase. 47% High and 51.51% Middle schools are in these phases.

Teacher Salary Comparisons
- When adjusted for Cost-of-Living index, VA’s salary ranks 7 out of 51 for Elementary, 9 out of 38 for Middle and 13 out of 50 for High school teachers.
- Most salary difference is with OH for High ($14,622) and Elementary school ($5,106) and IL for Middle school ($19,398).
- Among Southern states⁵, VA ranks 4th for High, and 2nd for Middle and Elementary schools.
- Most salary difference is with AL for High school ($8,348), and with GA for Elementary ($4,297) and Middle school ($1,217).
- VA’s teacher salaries are higher than the median of southern states; $14,299 higher for Elementary, $7,558 higher for Middle and $8,110 higher for High school.

Code.org Policy Metrics
- VA has enacted 7 out of 9 code.org’s policies. Not enacted are P1-’Create a State plan’ and P2-’Allow CS to satisfy a core graduation requirement’.
- 8 States have implemented all, including neighboring MD. VA is one of 17 states without P1 and one of 29 without P2.
- Among neighbors, only MD (all 9) and TN (8) have implemented more. KY, WV have also implemented 7.
- VA ranks 13th among states regarding the funding invested into CS education. PA, FL, NY, CA and AR are the top-5 states in terms of funding.

Recommendations
- Increase funding towards CS Education to ramp up SoL implementation
- Create a pipeline for recent CS graduates to teach.
- Salary has to be keep up with CS industry salaries to attract and retain skilled teachers.
- Compete and account for salary and incentives from neighboring states to discourage qualified teacher out-migration.

References:
1. 2022 State of Computer Science Education, Code.org,
2. Support K-12 Computer Science Education in Virginia, Code.org
3. Nine Policy Ideas to Make Computer Science Fundamental to K-12 Education, Code.org
4. State Tracking 10 Policies, Code.org
5. Southern Regional Education Board (SREB), sreb.org