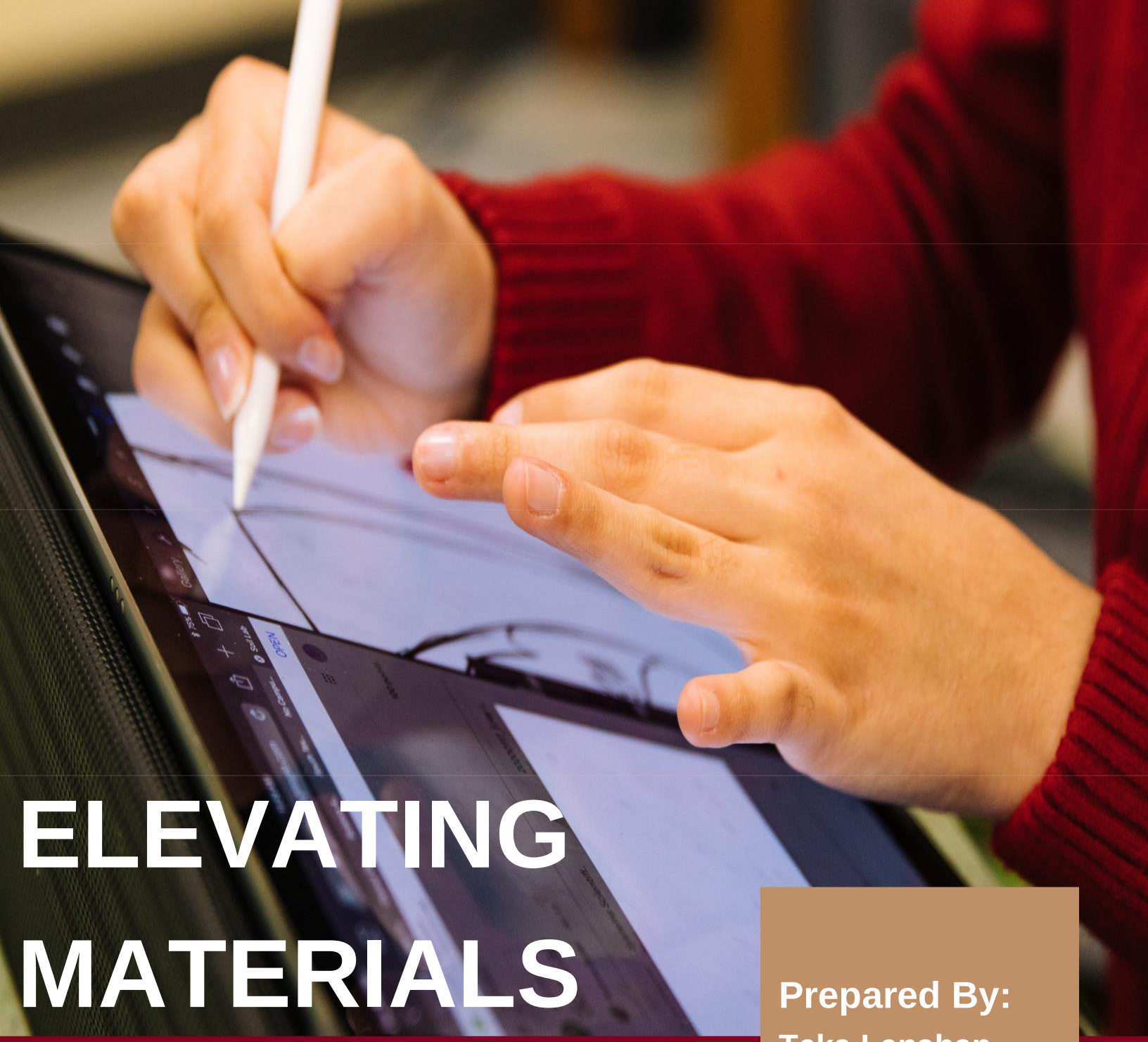

ELEVATING MATERIALS

Increasing the Use of High-Quality Instructional Materials in Virginia

Virginia Department of Education

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Prepared By:

Teka Lenahan,
MPP Candidate

Prepared for:

Michael Bolling,
Assistant Superintendent of Instruction

Disclaimer: The author conducted this research as a part of the Frank Batten School of Leadership and Public Policy at the University of Virginia. This paper is submitted in partial fulfillment of graduation requirements for the Masters in Public Policy degree. The judgments, analysis, and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School or the University of Virginia

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Executive Summary

Instruction, like communication is a combination of content and delivery. While set curriculum dictate the content, individual teachers are given a wide latitude to choose how to deliver this content. Increasingly teachers are opting to use non-textbook instructional materials to meet their students' differentiated needs. ***However, like many across the nation, too few Virginia teachers select and use non-textbook instructional materials aligned with state standards (Steiner, 2018). Students in classrooms that lack access to high-quality instructional mate-rials (HQIM) are overrepresented amongst those requiring nearly $1.5 billion in remedial college courses per year (EdReports-a, n.d.).***

As the State Educational Agency SEA for Virginia and chief enforcer of educational quality standards across the Commonwealth, the Virginia Department of Education VDOE holds significant power to recommend and/or implement education policy solutions. In this analysis, I propose five alternatives that aim to increase teacher selection of HQIM and ultimately improve the Standard of Learning SOL proficiency across Virginia. These include:

1. Option 1: Status Quo
2. Option 2: Expand Board Textbook Approval Process to Include IM
3. Option 3: Establish Intra-Regional High-Impact Teacher HQIM Committees
4. Option 4: Establish Public IM Quality Database
5. Option 5: Require New Teachers Receive 6 hours of IM-Specific PD along with a HQIM Rubric

I evaluated each of my alternatives using the following four criteria: 1) Cost-e ectiveness,2) flexibility, 3) administrative feasibility, and 4) equity. Based on this analysis, I recommend Option 3: Establish Intra-Regional High-Impact Teacher HQIM Committees. At $282,503 per newly proficient student, this alternative wasn't the most, or least cost effective. However, it demonstrated strong potential across all other criteria, particularly flexibility & administrative feasibility

To effectively implement this policy option, VDOE must efficiently collaborate with schools, school divisions, and postsecondary institutions. I recommend that the process for identifying high-impact teachers follow best practices laid out by the Association for Supervision and Curriculum Development & Math and Science Partnership Knowledge Management and Dissemination (Carr, 2013; MSPKD, n.d.). Additionally, I have recognized 8 regional flagship universities that I would recommend as conference locations for the respective region's HQIM Committee (See Figure 5).

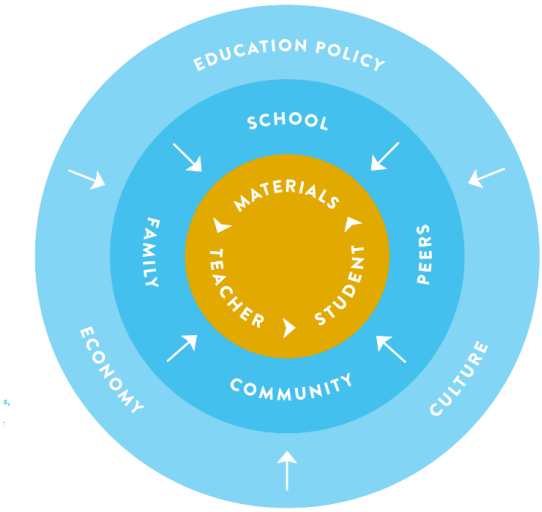
Introduction

To address this issue, I have partnered with Michael Bolling, the Assistant Superintendent of Instruction for Virginia. As the SEA for the Commonwealth, VDOE implements the state educational standards and vision of the Virginia Board of Education (VBOE) in accordance with federal legislation. VDOE is seeking to create a more equitable learning environment for all students across the Commonwealth. One of the ways they plan to do this is by increasing the use of HQIM in Virginia classrooms.

My Client

Public education plays a pivotal role in society as a key driver of economic and social mobility. To do this, however, an education system must be able to provide all students relatively equal opportunity to succeed based on their merit. The lack of access to HQIM threatens both VDOE's ability to ensure an equitable education across the Commonwealth as well as limits Virginia students' opportunity to realize their full potential. This issue impacts through 3 central means.

Figure 1: Components of Instruction



Source: Chingos M. &Whitehurst, G. (2012, April). Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core. Brown Center on Education Policy at Brookings. Brookings Institution.

First, VDOE dedicates a large amount of Title 1 federal grants and state revenue towards the development and implementation of evidence-based curricula throughout the Commonwealth (U.S. Department of Education-b, n.d.). While difficult to isolate the expenditure used exclusively for curriculum research and development, in Fiscal Year (FY) 2020 VDOE allocated over $7.5 million to direct assistance programs through general skilled services and management which likely includes such works (Auditor of Public Accounts, 2020). Without ensuring teachers are using HQIM aligned with state standards, this R&D represents an ineffective use of time and funds that could be directed towards other equalizing endeavors.

Second, the quality of instructional materials (IM) teachers select are often not uniformly distributed across a given state. School districts with a greater share of inexperienced teachers as well as low income students of color are most likely to suffer from a lack of HQIM (EdReports-a, n.d.). This further exacerbate socioeconomic achievement gaps between groups. Such educational inequities have been shown to negatively impact both the lives of the advantaged and disadvantaged student groups as well as Virginia as a whole (TNTP, 2018; Cassidy & Duncombe, 2016). This also contradicts the Board's stated vision to "create an excellent statewide system of public education that … ensures equity of opportunity for each student in a safe and healthy learning environment" (Virginia Board of Education, n.d.).

Finally, a growing body of research indicate that materials matter for student educational achievement. A 2011 large-scale RCT of math textbook effectiveness found that the difference in test scores between 2 textbooks was nearly double that between above-average and average teachers (Chingos & Whitehurst, 2012). Further, gaining access to HQIM positively impacted both teachers' classroom practices as well student engagement with the learning (EdReports-a, n.d.).

Contributing Factors

The shift towards less traditional instructional materials in classrooms has increased dramatically in the past decade in large part due to developments in both technology as well as political will. Today teachers have access to a breadth of educational resources at their fingertips via the internet. These include webpages, online articles, and open educational resources (OER)[1]. Such materials are increasingly being sought, selected, and modified by teachers to develop lesson plans and supplement the learning needs of their students (Jackson & Makarin, 2016).

A 2021 survey of Virginia teachers found that over a third of respondents used non-textbook materials more than once per week (Lenahan, 2021). While their efficacy and state-alignment remain largely empirically untested, these resources provide teachers greater flexibility to meet their students' differentiated needs compared to traditional textbooks (De Los Arcos et al., 2016). This transition without state oversight, however, has led to inconsistent instructional material quality across the Commonwealth.

Technology's reach into the classroom has been compounded by SEA's attempts to incorporate it in developing new and innovative learning experiences. Virginia, along with 32 other states, have created or adopted OER aligned with their respective state standards. This national movement towards web-based and digital resources has also been strengthened by a range of supporting state policies such as new procurement and open licensing regulations (Tepe & Mooney, 2018).

Cost to Society

This issue directly and indirectly costs hundreds of millions of dollars annually to various Virginia stakeholders including VDOE, school divisions (SD), and, by extension, taxpayers. If allowed to continue, these costs will likely continue to grow.

Direct Costs

In FY 2021 VDOE spent over $75 million in direct aid to schools for textbook, both physical and digital, procurement (Virginia General Assembly, 2020). As teachers are decreasing their use of such materials, this funding increasingly shifts from investment to a waste of resources. Further, in the 2020 Virginia Acts of Assembly, VDOE dedicated $107.47 per-pupil to SD for the explicit purpose of ". . . textbooks or any other instructional expenditure made by the school division". Given the Virginia public school system is serving 1,252,756 students this year, this expenditure exceeds $127 million (Virginia Office of the Governor, 2020; Virginia Department of Education-c, n.d.). Without a coherent system to ensure that this funding is used to procure HQIM, such resources are likely being underutilized by both VDOE and SD alike.

[1] OER: Repositories of open-licensed materials (Tepe & Mooney, 2018)

Individual SD across the commonwealth face additional losses by not regulating the quality of materials being used in their classrooms. In FY 2014 SD spent over $656 million in teacher support which includes curriculum development, training, and evaluation (Joint Legislative Audit and Review Commission, 2015). Despite this spending, teachers are often unable to successfully discern between high- and low-quality IM (Steiner, 2018).

Opportunity Costs

As a result of the large direct costs, Virginia faces similarly sizable opportunity costs if it does not address this problem. Despite many free or less-expensive HQIM options available, SD continue to order textbook bundles which per subject/grade level can cost them up to $4,000 edit (Virginia Department of Education-d, n.d.). This pool of funds could solve a host of other pressing educational issues such as ensuring students internet access. Additionally, teachers spend on average 7-12 hours per week searching for and creating IM (Goldberg, 2016). This time could be spent meeting both their students and own personal needs.

Background

Instructional materials have undergone a radical change nationally in the past decade. In 2015, Congress passed the Every Student Succeeds Act (ESSA) providing states greater flexibility in directing their own education systems (U.S. Department of Education-a, n.d.). Following this bill, states have worked to meet both new state standards and a rapidly evolving technological landscape. Legislative changes along with the growing popularity of Common Core State Standards (CCSS), has particularly impacted the IM teachers use. Within a year, over three-quarters of Mathematics and English Language Arts (ELA) teachers from multiple states reported changing more than half of their instructional materials (Kane et al., 2016).

As one of only 4 states to have never adopted CCSS, Virginia is somewhat unique compared to much of the rest of the country. There is evidence, however, to suggest the magnitude of this problem is similar between Virginia and Common Core states (Lenahan, 2021). Thus, we can reasonably draw from research across other states and tailor them to the educational landscape in Virginia today.

Governance

K-12 education in Virginia is chiefly governed by 3 entities: VDOE, VBOE, & the Office of the Secretary of Education. The Secretary is appointed by the Governor and is a member of the Board (Code of Virginia § 22.1-22:23). These three bodies often overlap in their functions as described in both Article VIII of the Virginia Constitution and § 22.1 of Code of Virginia. However, regarding textbooks & IM VDOE and VBOE play a more defined role. The statues germane to this issue are the following sections:

Virginia Constitution, Article VIII, § 4

> "The general supervision of the public school system shall be vested in a Board of Education of nine members . . . The Department of Education provides the staff and other resources to implement the constitutional and statutory requirements placed on the Board of Education" (Virginia Const. Art. XIV, § 4)

Virginia Constitution, Article VIII, § 5

D) [The Board] shall have authority to approve textbooks and instructional aids and materials ... in the public schools of the Commonwealth" (Virginia Const. Art. XIV, § 5).

Code of Virginia, § 22.1-238.

A) "The Board of Education shall have the authority to approve textbooks suitable for use in the public schools ... The Board shall publish a list of all approved textbooks on its website and shall list the publisher and the current lowest wholesale price of such textbooks

B) Any school board may use textbooks not approved by the Board provided the school board selects such books in accordance with regulations promulgated by the Board" (Code of Virginia § 22.1-238).

Code of Virginia, § 22.1-253.13:1.

B) The Board of Education shall establish educational objectives known as the Standards of Learning, which shall form the core of Virginia's educational program, and other educational objectives, which together are designed to ensure the development of the skills

that are necessary for success in school and for preparation for life in the years beyond" (Code of Virginia § 22.1-253.13:1).

IM Definition and Adoption

In 2010, VBoE defined textbooks as any "print or electronic media for student use that serve as the primary curriculum basis for a grade-level subject or course". Similarly, instructional materials were defined to be "all materials, other than textbooks, used to support instruction in the classroom, including, but not limited to, books, workbooks, and electronic media." (Code of Virginia § 22.1-238). While these definitions allow for the use of both digital and physical resources, they assume IM are only supplementary to textbooks. As broader instructional resources play a more integral role in instruction, this definition may have to be altered to meet this new function.

In accordance with Code of Virginia, § 22.1-253.13:1., the Board sets both Standards of Learning (SOL) and Curriculum Frameworks (CF). SD are then to develop local curricula and select materials which should be aligned with these state standards (Code of Virginia § 22.1-253.13:1). The vast majority of SD use VBoE-approved textbooks with less than 10% adopting textbooks using an alternative process in 2019 (Virginia Department of Education-g, n.d.).

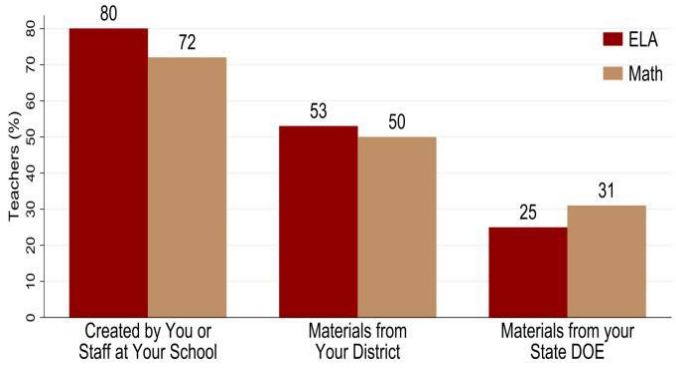
The process of material selection, however, differs between textbooks and broader educational materials. For the former, SD must select textbooks from either a list of Board-approved textbooks or similar local specified provided a list of textbooks reviewed and approved by the Board (Code of Virginia § 22.1-238). Conversely, there is little to no regulation or oversight of instructional materials. Without explicit direction by the state, individual schools and SD select and use their own locally-preferred resources.

Selecting Instructional Materials

As key decision-makers in IM selection, teachers often have significant autonomy in choosing what resources they use in the classroom. While few rigorous studies exist in Virginia, a growing wealth of literature among Common Core-aligned states has shown how they make these decisions. In 2016, a study across 5 states found that IM decisions are made primarily at the local school level (Figure 2). 80 and 72% of ELA and mathematics teacher respondents, respectively, reported often using materials they or staff at their school had developed. Conversely, less than a third reported doing so with materials from their SEA (Kane et al., 2016).

Figure 2: Teacher Use of Materials (%), by Subject and Source

(Displayed % limited to respondents that use the materials more than once per week)



Source: Kane et al. (2016). Teaching Higher: Educators' Perspectives on Common Core Implementation

When adequate IM are unavailable, teachers will spend a significant amount of time searching for and modifying materials via the internet. On average, educators across the country spend 7-12 hours per week on this activity alone (Goldberg, 2016). Many of these resources come from common sources such as Google and the social media platform, Pinterest (Opfer et al., 2016). Teachers search for online materials at even higher rates in schools serving a high proportion of low income and minority students. This largely unregulated process leads to inconsistent, and often inferior, material quality between classrooms (EdReports-a, n.d.).

Evaluation of Material Quality

Similar to the process of selecting materials, evaluating the quality of IM is often a decentralized process conducted by individual teachers. A 2017 study found that across 6 American city school systems, teachers typically did not have any formally defined rubric for evaluating the quality of materials. Rather, they draw on their personal experience and judgement to assess how well a resource meets 4 broad criteria categories: 1) visual appeal, 2) ease of use, 3) alignment to state standards, and 4) appropriate student engagement (Bugler et al., 2017).

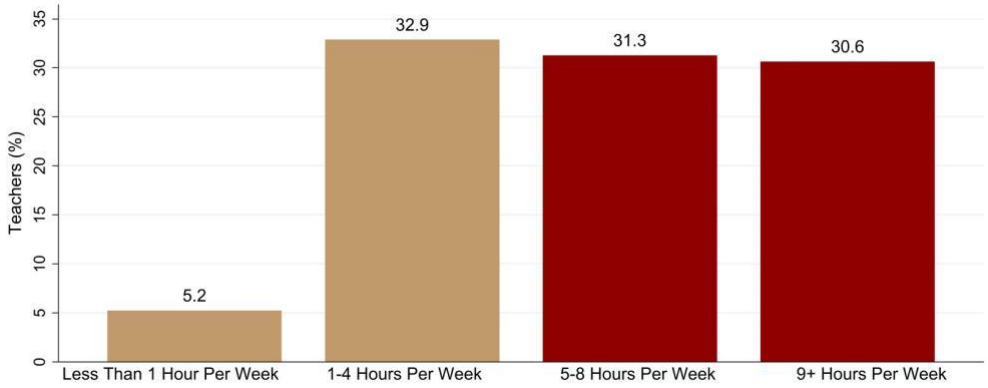
While the two former criteria are subjective, alignment to state standards and student engagement can be tested to see how well teachers can identify HQIM. When evaluating materials created or selected by teachers, these resources aligned with state standards only 20% of the time (Steiner, 2018). Similarly, such teacher-sourced IM on average were on grade-level nearly half as often as materials from the district (Opfer et al., 2016). These rates are even more pronounced for less experienced teachers and those in low-income districts (Schmidt et al., 2015; TNTP, 2018).

Virginia HQIM Survey

To better assess the IM adoption process across the Commonwealth, I designed a 2021 survey available to Virginia K-12 teachers. Despite a small sample size (N=871), the findings of this sur-vey largely correspond with those seen elsewhere on 2 key dimensions. First, Virginia teachers similarly have a strong preference for locally-sourced materials. While nearly 70% of teachers reported weekly usage of materials developed within their school, less than 15% teachers reported doing so with VDOE-developed materials. Second, teachers are spending significant time searching for materials (Figure 3). Almost two-third of respondents spend over 5 hours per week hunting for materials, with half of this group (one-third) spending 9+ hours per week on this activity alone (Lenahan, 2021).

While this survey provides valuable data, it likely underestimates the true magnitude of this issue. Respondents of the questionnaire were overwhelmingly older and more experienced teachers. Both of these groups are, on average, more comfortable finding and evaluating materials than their younger and less experienced peers (TNTP, 2018). Further, the quality of the IM selected throughout the Commonwealth remains largely unknown. Currently, the best source of information regarding IM quality in Virginia is a set of interviews VDOE conducted in January 2020.

Figure 3: Weekly Hours Spent Searching for Instructional Materials, Virginia (2021)



Source: Lenahan, T. (2021). HQIM Survey [Database]. Virginia Department of Education.

The interviews surveyed the best practices used by ELA teachers in consistently improving (based on Reading SOL scores) SD. From this dialogue 3 key insights can be gathered regarding their IM selection process. These teachers shared that they: 1) use grade-level reading materials, rather than those at each student's current ability, 2) find resources that bridge SOL with current events, 3) use a variety of text and media resources in their instruction and 4) continue to struggle with finding IM aligned with state standards (Virginia Department of Education, 2020). While such responses o er valuable information regarding what method and tools they use in the classroom, we do not know how this defers from struggling SD.

Existing Evidence

As an issue SEA are facing across the country, many have attempted their own innovative solutions to this problem. While many of these are too recent to have their impact empirically tested, they indicate both tremendous potential as well as illuminate potential challenges. As we explore the following policy solutions, VDOE should keep in mind two consistent factors across the actions taken by other SEA.

First, school and/or district-level instructional materials were periodically audited across the respective states. Without an understanding of what materials were being used in the classroom, none of these solutions could have successfully been implemented. Second, to varying degrees, educators were engaged throughout both the planning and implementation process. Teacher support and compliance is often the deciding factor in the success or failure of an intervention (Weisskirk, 2018). Teachers trust and rely on both their local educational community as well as other teachers highlighting that teacher support is necessary for ensuring buy-in across the Commonwealth (Bugler et al., 2017).

Solution 1: Establish a Database of Material Usage by School Division and their State-Alignment

After joining the Instructional Materials and Professional Development Network (IMPD) in 2017, Nebraska has become a national leader in identifying HQIM and expanding their use across the state (Nebraska Department of Education, n.d.).

The SEA provides both a list of reviewed instructional materials' state-alignment as well as an interactive school district map of their use across the state. This map in particular increases transparency between educators and the public.

Louisiana has similarly been a front runner for years in identifying and implementing HQIM into the state curriculum. When Superintendent John White took office in 2012, he and his team set out to reimagine the Louisiana public school system through curriculum-driven reforms. One of the actions taken was a quality review of curricula and instructional materials across the state. This review which ranks curricula/materials state-alignment in tiers (1 being the most aligned, 3 being the least) was made public and has become a centerpiece of their e orts to increase instructional material quality. To incentivize the use of higher-quality materials, the state has provided school districts discounted rates for materials in Tier 1 (Pondiscio, 2017; Kaufman et al., 2018).

What has made Louisiana unique, however, has been their SEA's level of engagement with their teachers. The state promotes direct communication with educators through in-person meetings, newsletters, and regular emails (Kaufman et al., 2018). Teachers in Louisiana have also been given a significantly greater amount of time in material-minded workshops and collaborative learning with other teachers than most other states (Kaufman et al., 2020). The effect of this teacher-centered approach to implementation has been Louisiana teachers both reporting higher use of standards-aligned materials as well as a deeper understanding of these standards compared to the national average (Kaufman et al., 2018).

Solution 2: Encourage the Use of State Standard Aligned OER Materials

Another solution by SEAs have has been to encourage teachers to select materials found on state-vetted OER. This option has grown in popularity as an increasing number of states have reviewed, developed, and/or adopted open curricula (Tepe & Mooney, 2018). In tandem with this increased use of OER has been a comparable growth in the research behind these repositories' efficacy. Numerous studies have found OER to be an easily adaptable, generally well liked by teachers, and cost-effective source of HQIM (De Los Arcos et al., 2016; Mishra, 2017). Some challenges to the widespread adoption of OER have been an overall lack of awareness regarding them and ease of use for teachers (Spilovoy et al., 2020; Mishra, 2017). In response to the potential of OER, SEAs across the country have adopted several innovative tactics to encourage their widespread.

In Utah, school districts identify "high-impact educators" to be involved in a state-wide OER task force. These teachers serve as liaisons between their districts and the state, and assist in re-viewing/curating open content based on teacher recommendations (Tepe & Mooney, 2018). One of the outgrowths of this e ort, in collaboration with Brigham Young University's Comprehensive Mathematics Instruction Framework, was the Mathematics Vision Project (MVP). EdReports, a third-party evaluator of instructional materials, found that all of the middle and high school MVP curricula were highly aligned with the Common Core standards (EdReports-b, n.d.).

Although the direct impact of MVP on student achievement remains empirically untested, it shows promise as Utah has experienced consistent and increasing improvement in NAEP scores in Math for years (National Assessment of Educational Progress, 2020). Another way various states have encouraged the use of OER is through greater funding, most commonly through grant programs. One state exemplifying this has been North Dakota. In 2015, the state allocated $110,000 to support OER adoption. A later audit of this intervention demonstrated that it saved students between 10-20 times that original investment in just two years (Spilovoy et al., 2020).

Key Takeaways for Virginia

From the literature we can see that states have implemented a range of unique solutions to increase the use of HQIM. Each of these options o er valuable insights into a possible intervention for Virginia. As a high-performing Non-Common Core adopting state, Nebraska is contextually very similar to the educational landscape of Virginia. Looking at both set of examples together, we can incorporate the following 4 major takeaways.

First, increasing knowledge and best practice sharing across SD is critical to improving performance and reducing inconsistency. **Second**, Teachers require flexibility to respond to the dynamic needs within their classrooms. **Third**, further targeted interventions might be necessary for struggling school systems. Louisiana's reform e orts were strengthened by targeted action, such as greater materials-specific professional development and tracking curriculum implementation, in low-performing districts (Kaufman et al., 2020). **Fourth**, solicit the feedback and recommendations of teachers across the Commonwealth. As displayed in Utah, educators can be an invaluable resource that can attract greater usage of the state's material repository.

Additionally, it should be noted that what has worked elsewhere is not automatically guaranteed to work in Virginia. To find the set of policy solutions that will be most effective in Virginia, previous solutions must be synthesized and tailored to meet the unique needs and constraints of Virginia teachers and students.

Evaluative Criteria

Each of my alternatives will be evaluated using the following four criteria: 1) Cost-effectiveness, flexibility, 3) administrative feasibility, and 4) equity. These criteria broadly capture the pertinent concerns of VDOE and other stakeholders impacted by my policy actions. Such needs have been assessed through discussions with SEA policymakers, existing literature, and teacher survey respondents (Bolling, 2021; Steiner, 2018; Lenahan, 2021). Using these metrics allows for a consistent method of comparison across options of their respective merits and weaknesses.

While my alternatives seek to increase HQIM selection, the end goal of these actions is to improve student educational outcomes. The outcome I will measuring is SOL proficiency scores. To facilitate comparisons across alternatives, each will receive a rank from low, medium, to high based on how well it addresses the concerns of each criteria.

Cost-Effectiveness

This criterion will measure an alternative's total cost over its efficacy in increasing the number of SOL proficient students. Total costs include direct and indirect costs to VDOE, SD, and other stakeholders. These will be projected over the next 10 years, with the present value used in this ratio. Conversely, effectiveness will be assessed through correlational and causal evidence regarding each option's impact on SOL proficiency. Options that o er low returns on investment will receive a low score on this metric.

Administrative Feasibility

Administrative feasibility will address the ease of implementing an option. This will be determined by assessing the required staff and agency infrastructure necessary for each alternative. Factors that will impact this metric include new essential positions and/or roles, research and development of tools/assessments, and technical expertise required for effective rollout. Options that pose significant challenges to successful implementation will score poorly on this metric.

Flexibility

Flexibility will measure the autonomy an option provides teachers to make IM selection decisions. Teachers require adaptability and independence to effectively meet the differentiated needs in their classrooms (Bugler et al., 2017). This will be measured with a qualitative evaluation of the IM adoption process laid out by each option. Alternatives that severely limit teacher autonomy will score poorly on this metric.

Equity

Equity will be evaluated based on the level that benefits are dispersed across SD. As this issue disproportionately burdens inexperienced teachers and those in struggling districts, alternatives must be evaluated on their efficacy across high and low-needs district populations (EdReports-a, n.d.). I will project this with a mixture of qualitative and quantitative research on the equitable impact for each alternative. Options that show significant disparities in efficacy across high and low-needs SD will score poorly on this metric.

Policy Options

From 2020 to 2030, the school age (5-19) population across Virginia is expected to grow by over 121,000 or 7.5%. Much of this growing student body is driven by new students of color, particularly Hispanic/Latinx students (Weldon Cooper Center, 2019; Virginia Department of Education-c, n.d.). In addition to more students, the number of teachers in Virginia is projected to increase by 2,712 (3.47%) over this period (Virginia Employment Commission, n.d.).

The 3-year average [2] SOL proficiency rate for Black and Hispanic students are 20% and 10% lower than their White counterparts, respectively (Virginia Department of Education-f, n.d.). While these achievement gaps might narrow over time, for my analysis I will hold constant the current subgroup proficiency rates. Weighting the projected student demographics with their current average proficiency rate yields a statewide proficiency rate of 78.39% or alternatively a 21.61% fail rate (Virginia Department of Education-f, n.d.; Virginia Department of Education-c, n.d.).

While it is unclear how much of this is attributable to the lack of HQIM, a recent study showed the average difference in test scores between high and low-quality curricula to be 0.2 standard deviations (Chingos & Whitehurst, 2012). In the case of Virginia, assuming the same relationship exists for IM quality, this difference would amount to a potential 2 percentage point increase to the statewide average proficiency rate. Each alternative's efficacy will thus be estimated by the percentage of this potential it is likely to realize.

Option 1: Status Quo

In Option 1, no changes are made to Virginia's education system with regard to IM selection.

Cost-Effectiveness: Currently there is little research that indicates whether or not this is-sue will naturally remedy itself. Considering the high level of uncertainty, I estimated a small consistent increase to SOL proficiency of 0.2 percentage points over the 10-year frame. This resulted in 33,569 newly proficient students. The present value of all associated costs for this option will be $67,579,448,775. Thus, the CER is $2,013,146 per newly proficient student (Author calculations, Appendix. Table 4).

Flexibility: Freezing current policies maintains a significant level of teacher self-determination over IM. Given there is no reduction in teacher IM selection, this option ranks **high** in autonomy.

Administrative Feasibility: As a continuation of current practices, no new regulatory changes or instructional infrastructure would need to be developed or implemented. Thus, this option ranks **high** in administrative feasibility.

Equity: Without policy intervention, gains to HQIM adoption will likely remain heavily localized. The result of most of which will go to higher-performing SD and/or those with more experienced teachers. Given this this option ranks **low** in equity.

[2] 3 Year average: Based on proficiency rates from 2016, 2017, 2018 (Virginia Department of Education-d, n.d.)

Option 2: Advocate VBoE Expand Textbook Approval Process to Include Instructional Materials

This policy option recommends the expansion of the Board's current textbook approval regulation to include broader IM. SD would then be required to use IM from an annually updated list of Board approved vendors or similar local-approval process. In 2019, SD that used textbooks were nearly 5x more likely to use VBoE-approved textbooks than their own local approval process (Virginia Department of Education-g, n.d.). Thus, this action would likely similarly in-crease the consistency of IM quality within and across SD. This change in regulation can be accomplished by the Board proposing a revision that would require the approval of the Virginia Attorney General & Governor (Virginia Department of Education-a, n.d.).

Cost-Effectiveness: Assuming VBoE selects all HQIM, this option will likely have the largest effect of any option. I estimate this option would increase the number of SOL proficient students by 302,122.

The most significant costs of this will be vetting & selecting IM quality along with a probable increase in teacher turnover due to a loss of autonomy (Miller, 2021). Teacher turnover creates significant financial burdens due to the loss of their skill and experience. The present value of all associated costs for this option will be $67,623,350,545. Thus, the CER is $223,828 per newly proficient student (Author calculations, Appendix. Table 5).

Flexibility: While this option increases IM uniformity across the Commonwealth, the draw-back is that it highly restricts individual teacher sovereignty over their classroom instruction. Therefore, this option ranks **low** in autonomy.

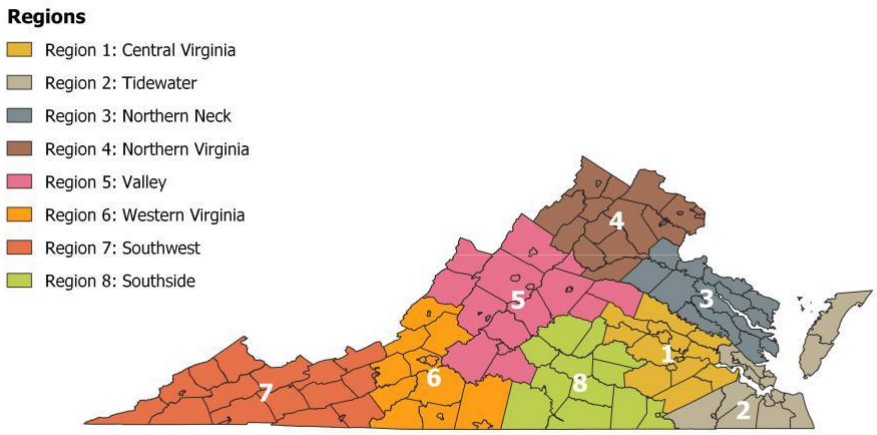
Administrative Feasibility: While this regulation change would simply require the approval of VBoE and other state officials, identifying and evaluating IM used in Virginia poses administrative challenges. These range from identifying qualified evaluators to enforcing compliance (Lashley-b, 2021). For these reasons, this option ranks **medium** in administrative feasibility.

Equity: As this option is uniformly applicable it distributes benefits evenly across the Commonwealth. Although low-performing would likely have to alter more of their IM, these costs would be mitigated by state subsidies as they are for textbooks. This alternative ranks **high** in equity.

Option 3: Establish Intra-Regional Professional Learning Committees of High-Impact Teachers

This policy option recommends VDOE assemble a "HQIM Committee" of high-impact teachers (HIT) within each of the 8 educational regions (Figure 4). These committees would consist of approximately 20 - 25 educators and meet bi-annually to discuss the IM & practices they and the teachers in their schools use. Teachers are most receptive to the opinion and actions of their fellow peers, particularly those within their schools (Kane et al., 2016; Bugler et al., 2017). By providing a forum to increase knowledge sharing and best practices across SD, this option will likely lead to a significant degree of improved HQIM adoption.

Figure 4: Map of Virginia, by Educational Region



Source: Virginia Department of Education-e. (n.d.) Virginia Public School Listing - By Region; U.S. Census Bureau.
(n.d.). Geographic Divisions [Shapefile].

Cost-Effectiveness: As teachers are strong influencers in their peers' behavior, this option others a powerful medium to improve HQIM selection and thus achieve relatively large gains to SOL proficiency rates. I estimate this option would increase the number of SOL proficient students by 239,218.

The most significant cost of this option will be identifying HIT, paying participants overtime, and hiring education specialists to moderate the conference. The present value of these and other costs for this option will be $67,579,754,344. Thus, the CER is $282,503 per newly proficient student (Author calculations, Appendix. Table 6).

Liberty: Without any binding legislative actions, teachers would retain control over their IM selection decisions. Thus, this option ranks **high** in autonomy.

Administrative Feasibility: As an initiative which doesn't require Board approval, this option allows VDOE to more quickly begin its implementation. However, significant time and e ort must be placed in identifying HIT and organizing conferences. Due to this, this option ranks **medium** in administrative feasibility.

Equity: In addition to providing support to all SD irrespective of performance, this option others the added potential bene t of disseminating locally preferred HQIM and practices. Increasing the use of culturally relevant materials could further bene t disadvantaged (i.e., rural, Black, Hispanic, etc.) students who are overrepresented among low-performing SD (Dickey, 2017; Hughes et al., 2004). Therefore, this option ranks **high** in equity.

Option 4: Establish Public Database of IM Quality State Standard Alignment

This policy option recommends VDOE compiles a public-facing list of IM used in each SD along with their scored quality and alignment to state standards. Using IM usage data gathered throughout the school year VDOE will develop and annually update a "HQIM Database". This

alternative would seek to increase HQIM selection by fostering greater IM knowledge sharing across SD.

Cost-Effectiveness: Like other alternatives the effectiveness of this option remains empirically untested. While it would increase transparency across SD, the influence on teacher IM selection (and by extension our outcome) is significantly lower for SEA than more local entities (Kane et al., 2016; Lenahan, 2021). Factoring this in, I estimate this option would increase the number of SOL proficient students by 127,782

The most significant costs of this option are hiring a web developer and vetting IM. The present value of all associated costs for this option will be $67,582,510,104. Thus, the CER is $528,890 per newly proficient student (Author calculations, Appendix. Table 7).

Autonomy: While this option does not intrinsically restrict teacher decision making, highly involved parents, community members, and/or local officials might pressure their SD to adopt certain materials. This will more likely be the case in low-performing SD (Kane & Staiger, 2002). Given this, this option ranks **medium** in autonomy.

Administrative Feasibility: As there is currently no infrastructure to develop this database and/or map, novel data on IM would need to be collected and analyzed. This process would require multiple surveys and sustained cooperation across teachers and school/SD-level administrators. Thus, this option **low** in administrative feasibility.

Equity: This option likely benefits all SD as it provides them and their teachers a means to observe their IM state alignment and those used in other divisions. This could have greater impacts for lower-performing SD who might not be aware of materials used elsewhere. Conversely, as noted in autonomy, making this database public might open less-aligned SD to public scrutiny. As lower-performing divisions often have lower-quality materials, this would unfairly target and cost these SD. Taking this into consideration this option ranks **medium** in equity.

Option 5: Require Teacher Receive 6 Hours of IM Evaluation-Specific Professional Development and IM Quality Rubrics

This policy option recommends VDOE require the completion of a minimum of 6 hours of IM quality evaluation-specific professional development (ESPD) for new Virginia teachers as part of their licensure requirements. This time should be divided into 2 3-hour seminars. Once completed these teachers will be provided with rubrics to support HQIM selection throughout the year. Adding this requirement to licensing will involve regulation changes to the Standards of Quality (SOQ) mandated by VBoE & the Secretary of Education. This will necessitate approval by VBoE, Virginia Attorney General, and Governor (Virginia Department of Education-a, n.d.).

Cost-Effectiveness: Recent studies suggest that that the impact of differing IM are insignificant if they are not paired with ESPD (Chingos & Whitehurst, 2012). These findings allude to a strong relationship between these trainings and HQIM adoption and ultimately proficiency scores. Therefore, I have projected this option would increase the number of SOL proficient students by 262,960.

This alternative, however, is more costly than other options due to the costs of universal training. The present value of these and other costs for this option will be $67,639,591,108. Thus, the CER is $257,224 per newly proficient student (Author calculations, Appendix. Table 8).

Autonomy: Without any binding legislative actions, teachers would retain control over their IM selection decisions. Thus, this option ranks **high** in autonomy.

Administrative Feasibility: As an initiative which doesn't require Board approval, this option allows VDOE to more quickly begin its implementation. However, significant time and e ort must be placed in identifying HIT and organizing conferences. Due to this, this option ranks **medium** in administrative feasibility.

Equity: In addition to providing support to all SD irrespective of performance, this option offers the added potential bene t of disseminating locally preferred HQIM and practices. Increasing the use of culturally relevant materials could further bene t disadvantaged (i.e., rural, Black, Hispanic, etc.) students who are overrepresented among low-performing SD (Dickey, 2017; Hughes et al., 2004). Therefore, this option ranks **high** in equity.

Recommendation

Outcomes Matrix

Option/*Criteria*	**Cost-Effectiveness**	**Flexibility**	**Administrative Feasibility**	**Equity**
Weights (%)	(40%)	(30%)	(15%)	(15%)
Option 1: Status Quo	$2,013,146 / Newly Proficient Student	High	High	Low
Option 2: Expand the VBoE textbook approval process to include IM	$223,828 / Newly Proficient Student	Low	Medium	Medium
Option 3: Establish intra-regional professional learning committees	$282,503 / Newly Proficient Student	High	Medium	High
Option 4: Establish a public database of IM quality and alignment	$528,890 / Newly Proficient Student	Medium	Low	Medium
Option 5: Requiring IM Professional Development	$257,224 / Newly Proficient Student	High	Low	High

The alternative I recommend is Option 3: Establish Intra-Regional HQIM Professional Learning Committees. This option creates the most optimal combination of strengths across my four criteria. Over the span of 10 years, I project Option 3 will lead to over 239,000 students achieving SOL proficiency who would likely not otherwise. This significant gain additionally comes with a modest cost of $282,503 per newly proficient student. Finally, the option is reasonably administrative feasible relative to other alternatives. Despite requiring the development of new statewide infrastructure such as High-Impact Teacher (HIT) evaluation tools and procedures, once in place, VDOE & other relevant entities' activities are largely limited to committee selection and organizing recurrent biannual conferences.

Implementation

Key stakeholders in the effective implementation of this option include VDOE, partnering universities, teachers, and school divisions. Although each entity should be consulted throughout the implementation process, each largely occupies one of two functional categories, planning/administration (PA) or front-line implementors (FLI). The former will be chiefly concerned with developing the infrastructure necessary for successful rollout. The latter, in turn, will focus on nominating committee participants and organizing their transportation to the respective university. The entities in the planning/administration are VDOE and partnering universities. FLI will be composed of teachers and school divisions.

Nearly all of the upfront additional costs associated with Option 3 are covered by available CARES Act funding (Cassada, 2021). Without stringent financial constraints or cumbersome regulation changes, VDOE has significant latitude to implement this option. To most effectively execute this alternative, I recommend VDOE organize the necessary actions into two temporal phases: 1) Infrastructure Development & 2) Execution and Evaluation.

Phase 1: Infrastructure Development Identifying High-Impact Teachers

An initial and integral element of the rollout of Option 3 is to efficiently identify HIT. To do this, I recommend VDOE employ best practices from the Association for Supervision and Curriculum Development (ASCD) the Math and Science Partnership Knowledge Management and Dissemination (MSPKD). These groups recommends that a teacher's impact potential should be evaluated across a variety of domains including the level to which they: 1) foster a collaborative development culture with peers, 2) are willing and able to use research to improve their teaching, 3) embody a growth mindset, and 4) improve outreach and collaboration with families and the community (Carr, 2013; MSPKD, n.d.).

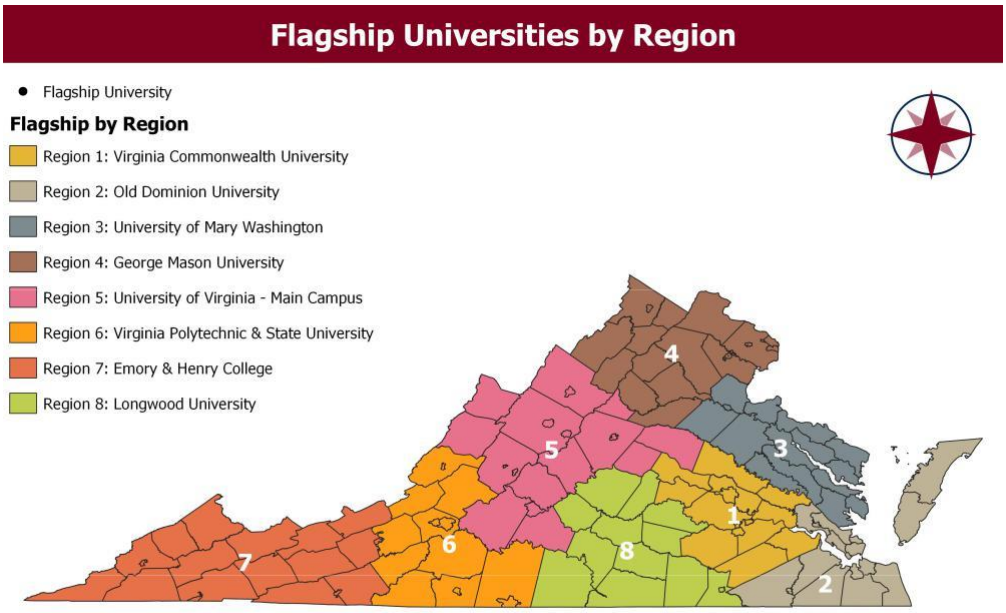
To operationalize these insights, I recommend VDOE annually solicit school district-level administrators for teacher-referrals of those who demonstrate such qualities. A guiding document for this activity should be provided to support all LEA which includes the listed criteria and an overview of the purpose of the HQIM Committees. Finally, administrators should receive educational materials on combatting implicit biases in their referrals. These materials will attempt to ensure that teachers of all backgrounds will receive equal consideration (Cambell & Ronfeldt, 2018; Hanover Research, 2019). To create the most robust committees, the pool of referrals must be as representative as possible of the diversity of races and backgrounds present within the student population (Project Management Institute, 2017). Once a composite list of referrals is gathered from each school division, VDOE should select 20 - 25 committee members from that pool. In their selection, VDOE should focus on selecting teachers from varied schools/school divisions, experience levels, and backgrounds.

Organizing Conferences

The next phase of implementation will be developing partnerships with universities to host these bi-semester committee meetings. I have selected 8 universities, one in each region, that should function as the host for their respective region's HQIM Committee Conference (Figure 5).

These hub or "flagship" universities were chosen based on a mixture of size and geographical location (Homeland Infrastructure Foundational-Level Data, 2020). VDOE should begin discussions with these universities immediately following, or in tandem, with their committee selections. Fostering relationships with these institutions, beyond simply requesting conference space, will likely increase both their willingness to host such events and potentially garner a reduced fee.

Figure 5: Map of Flagship Universities by Region, Virginia



Source: Homeland Infrastructure Foundational-Level Data. (2020 September). Colleges and Universities [Shapefile].; US Census Bureau. (n.d.). Geographic Division [Shapefile]; Virginia Department of Education-e. (n.d.). Virginia Public School Listing - by Region [Database].

Phase 2: Execution and Evaluation

The final phase of Option 3 includes conducting the conferences and subsequently evaluating the program's efficacy. For the former, VDOE should contract two teacher education specialists per region to serve as facilitators. Following the conference, participant feedback should be solicited to identify and address any concerns or questions that might arise. Finally, an annual HQIM Convergence survey should be circulated throughout LEA across the Commonwealth. This questionnaire will quantify how these conferences have impacted HQIM selection within school divisions.

Implementation Challenges

Underlining this implementation plan is the assumption that all relevant actors (VDOE and local administrators, university decisionmakers, and teachers) are willing participants. This is a reasonable assumption as for each actor there are clear benefits with minimal direct or opportunity costs. With such naturally strong incentives, both PA & FLI entities can and should use an encouraging, rather than coercive, leadership style.

The greatest threats to the successful implementation of Option 3 are 1) identifying pools of teachers who can teach and learn the most from one another and 2) uncertainty regarding the later dissemination of conference professional learning. Both of these represent significant concerns as they directly impact what knowledge is shared within the committee and, broadly, what is relayed back to the local school community. Accurately predicting the social dynamics of the selected members will always pose a challenge, but these can be somewhat mitigated over time as VDOE grows more experienced in organizing such events. Additionally, while VDOE can't enforce dissemination, outreach to participants' LEA could encourage such information distribution.

Conclusion

Teacher choice of IM matter. They provide teachers not only the flexibility to meet their students' differentiated needs, but o er the potential to significantly effect academic proficiency. As integral components of teaching in Virginia, VDOE must take action to ensure that HQIM are used across the Commonwealth. Through such actions, VDOE can increase equity in educational quality, improve SOL proficiency, and help each student reach their full potential.

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Appendix

Fig.1: Components of Instruction

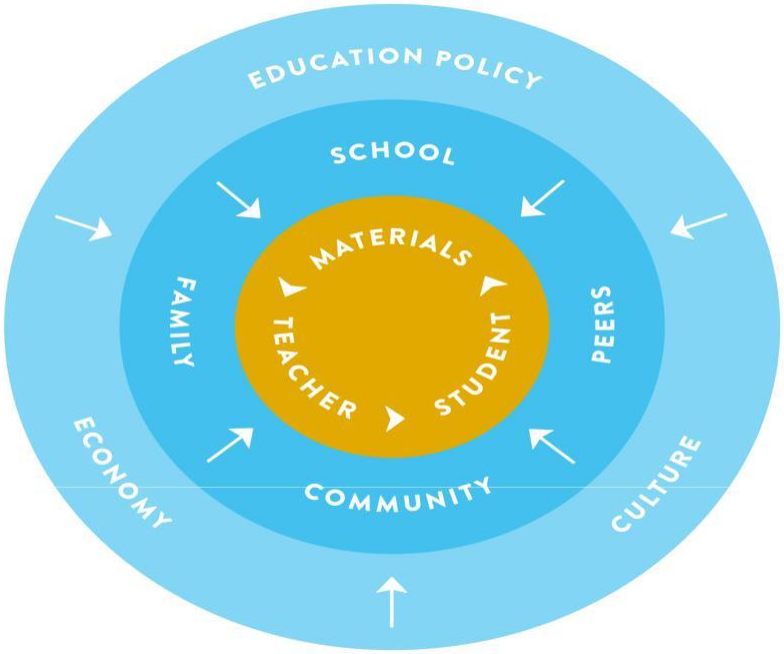

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Figure 2: Teacher Use of Materials (%), by Subject and Source

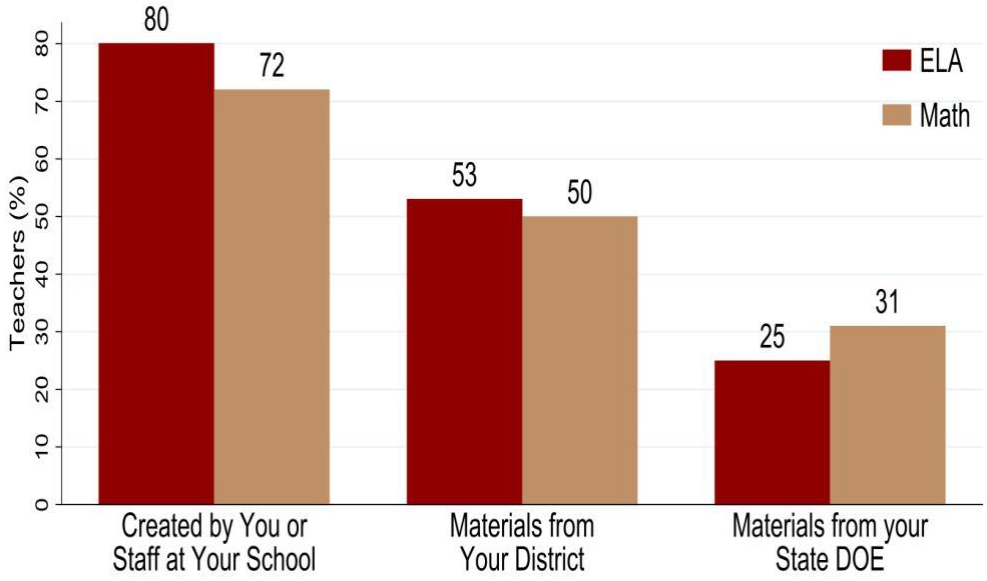

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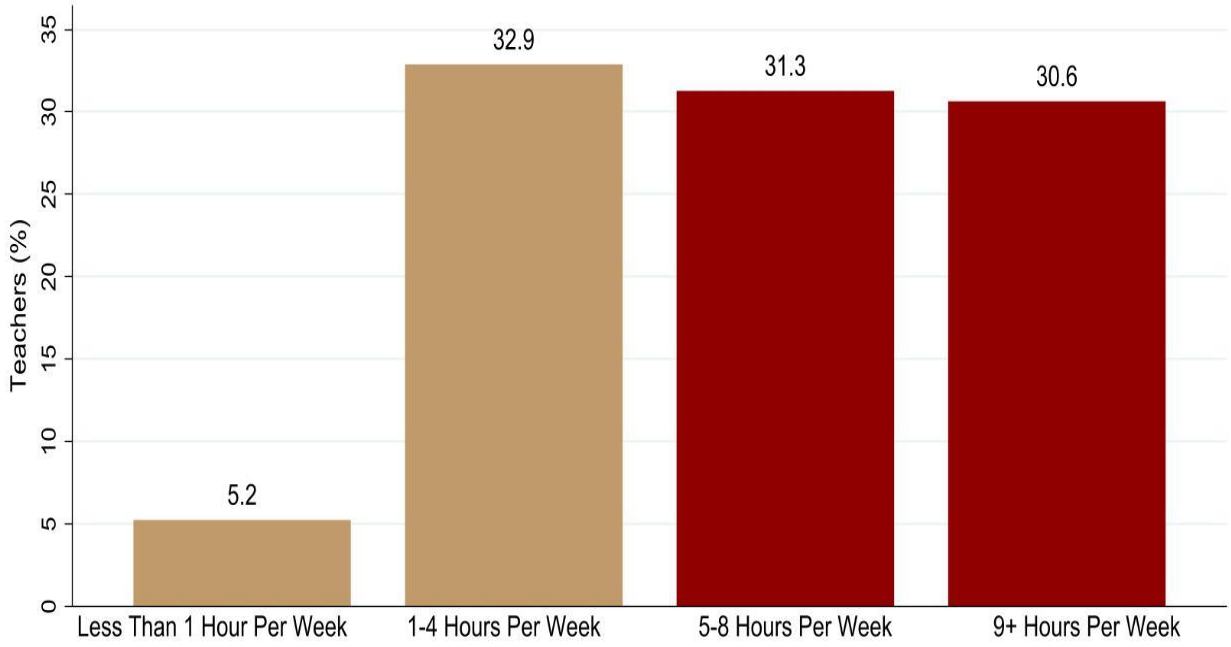
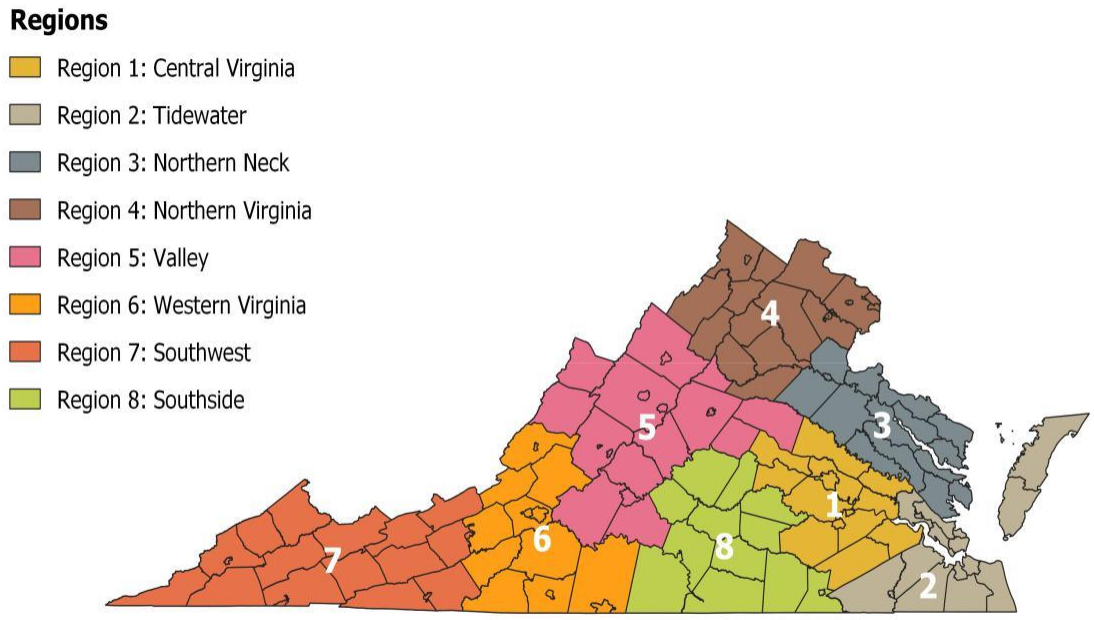
Figure: 3: Weekly Hours Spent Searching for Instructional Materials, Virginia (2021)



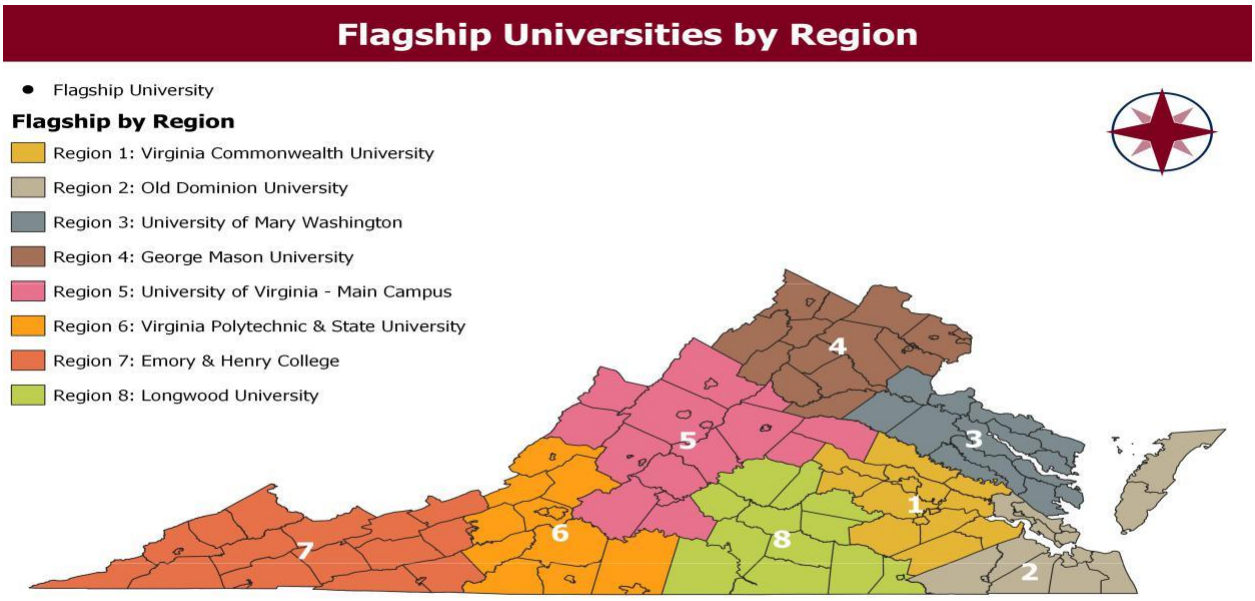
Lenahan, T. (2021). HQIM Survey [Database]. Virginia Department of Education.

Figure 4: Map of Virginia, by Educational Region



VDOE. (n.d.) Virginia Public School Listing - By Region; U.S. Census Bureau. (n.d.). Geographic Divisions [Shapefile].

Figure 5: Map of Flagship Universities by Region, Virginia



Homeland Infrastructure Foundational-Level Data. (2020 September). Colleges and Universities [Shapefile]. US Census Bureau. (n.d.). Geographic Division [Shapefile]
Virginia Department of Education-e (n.d.). Virginia Public School Listing - by Region [Database

Table 1: HQIM Survey Descriptive Statistics

	Teachers (%)		Teacher (%)
Race/Ethnicity		**Gender**	
White	79.81	Woman	86.16
Black	5.93	Man	13.10
Latino	0.93	No Response	0.74
Other Race	3.33	**Subject Taught**	
No Response	10.00	CTE	6.54
Years of Experience		Elementary/Early Childhood	6.42
1-3 Years	5.17	English Language Arts	28.01
4-6 Years	5.51	Fine Arts	1.26
7-10 Years	6.54	Foreign Language	0.69
11-20 Years	20.32	Health/Physical Education	2.07
20+ Years	24.68	Mathematics	31.00
Highest Licensure Level Achieved		Science	23.19
Postgraduate Professional	36.97	Social Studies/History	22.50
Collegiate Professional	21.70	Special Education	8.50
Provisional	2.30	Other Subject	3.10
Provisional Special Education	0.80	No response	37.77
Provisional Career-Switcher	0.34	**School Level**	
No Response	37.89	Elementary	41.47
		Middle	23.49
		High School	35.05

Note: N=871

*Demographics were asked last in the survey, so rates of missing values are higher than in other sections

Table 2: HQIM Survey Material Usage (Selected Questions)

Questions	Answer Choices				
How does your school provide teachers and students with textbooks	Both physical and digital textbooks	Physical textbooks (only)	Digital textbooks (only)	School does not provide textbooks	
My school division provides adequate professional development for textbook use	Strongly disagree	Disagree	Agree	Strongly Agree	
How frequently do you use each of the following resources for instruction?					
Textbooks (physical or digital)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Digital textbook resources (digital resources that come as part of your physical or digital textbook purchase)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Non-textbook books (physical or digital)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Curated open educational resources (publicly available resources that have been selected/recommended by your division)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Subscription- or fee-based resources (Dreambox, Newsela, teachers-pay-teachers, etc.)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Web-based resources (i.e., journal articles, interactive websites, social media etc.)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day

Table 3: HQIM Survey Material Usage (Continued)

Questions	Answer Choices				
Estimate the average number of hours per week that you have spent searching for instructional materials since September 2020	Less than 1 hour per week	1-4 hours per week	5-8 hours per week	9-12 hours per week	More than 12 hours per week
How frequently have you used resources developed by each of the following groups for instruction this school year:					
Self-created materials	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Materials created with or by other staff at your school	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Materials created/provided by your school division or through a collaboration among school divisions	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Materials created/provided by the Virginia Department of Education (including resources from VDOE content area o ces, GoOpenVA, and Virtual Virginia)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day
Materials created outside of Virginia (other states or via the internet)	Never	Once or twice a month	About weekly	More than once a week	Nearly every day

Table 4: Option 1 Cost-Effectiveness Projections

Option 1 (in Thousands)										
Item / *School Year* (SY)	SY1	SY 2	SY 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Direct Expenditure (minus per pupil IM expenditure)	8,119,888	8,284,466	8,452,362	8,623,642	8,798,373	8,976,626	9,158,469	9,343,976	9,533,218	9,726,273
Per Pupil IM Expenditure	174,490,119	175,800	177,109	178,419	179,729	181,038	182,348	183,658	184,967	186,277
Total Annual Cost	8,294,378	8,460,266	8,629,471	8,802,061	8,978,102	9,157,664	9,340,817	9,527,633	9,718,186	9,912,550
Net Present Value	$67,579,449									
Benefits										
Increase in # of SOL Proficient Students	3.247	3.272	3.296	3.320	3.345	3.369	3.393	3.418	3.442	3.467
CER	$2,013.15									

- **Direct Expenditure (minus per pupil IM expenditure):** This item uses the 2020 state budget for Direct Aid to Public Education (Auditor of Public Accounts, 2020). Subtracted from this sum per pupil IM expenditure calculated below. To project into the future a constant 2% increase was included to adjust for inflation
- **Per Pupil IM Expenditure:** For this item, I projected student and multiplied that number by the VDOE appropriated $107.47 for textbooks & IM (Virginia Department of Education-c, n.d.; Virginia Office of the Governor, 2020).
- **Increased Proficiency:** I first calculated a base number of students who would be proficient. This was based on the total estimated student population multiplied by a weighted average proficiency rate (78.39) based on current student trends (Weldon Cooper Center, 2019; Virginia Department of Education-c, n.d.; Virginia Department of Education-f, n.d.). Based on the uncertainty of this option, I assumed a constant 0.2 percentage point increase in SOL proficiency over this period. The resulting equation was as follows:
  - IP = ((.7839 + .02) *Estimated students) - (.7839 * Estimated students)

Table 5: Option 2 Cost-Effectiveness Projections

Option 2 (in Thousands)										
Item / *School Year* (SY)	SY1	SY 2	SY 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Baseline Costs	8,294,378	8,460,266	8,629,471	8,802,061	8,978,102	9,157,664	9,340,817	9,527,633	9,718,186	9,912,550
IM Vetting & Selection	330	330	330	330	330	330	330	330	330	330
Teacher Turnover	5,499	5,514	5,530	5,545	5,561	5,576	5,592	5,607	5,623	5,638
Division PD	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
HQIM Convergence Survey	3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Annual Cost	8,300,211	8,466,112	8,635,332	8,807,937	8,983,994	9,163,571	9,346,740	9,533,572	9,724,140	9,918,519
Net Present Value	$67,623,351									
Benefits										
Increase in # of SOL Proficient Students	29.23	29.44	29.66	29.88	30.10	30.32	30.54	30.76	30.98	31.20
CER	$223.83									

Baseline Costs: Total costs associated with baseline (see Table 4)

Vetting & Selecting IM: To effectively mandate which IM will be used, VBoE would need to annually identify, evaluate, and select HQIM. This will require VBoE/VDOE design and implement methods vetting and selecting for these materials.

- Based on the associated costs to Maryland for a similar process, this will cost approximately $333,000 ($328k vetting + $5k selection) (Lashley-a, 2021).

Teacher Turnover: Schools facing punitive accountability measures are often the source of resistance (Steele, 2019). As IM are valuable and commonly resources used by teachers restricting their control over these will almost certainly lead to some opposition, including teacher turnover (Lenahan, 2021; Miller, 2021).

- The total cost from a 0.5 percentage point increase in the average teacher turnover across Virginia (from 10.2% to 10.7%) would be nearly $5.5 million annually (Sorensen et al., 2018; Learning Policy Institute, 2017).
- The cost of increased turnover (CIT) was calculated using the following equation:
  CIT = (10.7% * Projected teacher population * cost to replace) - (10.5% * Projected teacher population * cost to replace)

SD Professional Development: This item covers actions to ensure SD understand the new regulations put forth in this option

HQIM Convergence Survey: Similar to all new alternatives, an annual survey should be conducted to measure the efficacy of the solution. Designing this survey will cause this item to have higher upfront costs. After the first year, however, the survey can be recycled with little to no edits

Increased Proficiency Using a similar method as in Option 1, I added my expected gains to proficiency and subtracted a baseline number of estimated proficient students. Given the efficacy of similar current regulations, at full rollout, I projected this option would increase SOL proficiency by 1.8 percentage points (90% of potential). However as this was a new policy, I anticipated a gradual realization of these gains prior to reaching full potential.

Table 6: Option 3 Cost-Effectiveness Projections

Option 3 (in Thousands)										
Item / *School Year* (SY)	SY1	SY 2	SY 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Baseline Costs	8,294,378	8,460,266	8,629,471	8,802,061	8,978,102	9,157,664	9,340,817	9,527,633	9,718,186	9,912,550
Identifying HIT	16.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Overtime Wages	21.15	21.47	21.80	22.13	22.46	22.80	23.14	23.49	23.85	24.21
New Education specialist hires	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74
Reserving Conference Space	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
HQIM Convergence Survey	3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Annual Cost	8,294,426	8,460,305	8,629,511	8,802,100	8,978,142	9,157,704	9,340,858	9,527,674	9,718,228	9,912,592
Net Present Value	$67,579,754									
Benefits										
Increase in # of SOL Proficient Students	8.12	17.99	23.07	26.56	26.76	26.95	27.15	27.34	27.54	27.73
CER	$282.50									

Baseline Costs: Total costs associated with baseline (see Table 4)

Identifying HIT: This includes soliciting principals' teacher recommendations, any surveys used, and other actions to recognize HIT. Little data is available about the cost of this activity, so the numbers projected are likely to vary. Once infrastructure is built to identify HIT, however, the costs should decrease significantly for future years.

Overtime Wages: This captures additional time and a half costs of overtime hours for participants. Each seminar would last a full day (8 hours) and occur twice per year; 16 hours/year in total

- Overtime Costs = of participants * 16 * (1.5* Projected average hourly wage)
- Average hourly wage/year calculated by extending annual salary change rates trends since 2010 (Virginia Department of Education-b, n.d.)

New Education specialist hires: This captures the cost of hiring/recruiting specialists to moderate these conferences based on average salaries for these specialists in Virginia (Salary.com, n.d.)

- Cost of Hires = 2 * of conferences [regions] * (of hours *average hourly wage) = 2 * 8 * 16 * ($46,606/2,080)

Reserving University Conference Space: Based on rates to request conference space at University of Virginia (University of Virginia, n.d.)

- Conference Space = Reservation cost * 2 * of conferences [regions] =$100*2*8

Increased Proficiency Using a similar method as other Options, I added my expected gains to proficiency and subtracted a baseline number of estimated proficient students. Given teachers openness to the input of other teachers, at full rollout, I projected this option would increase SOL proficiency by 1.4 percentage points (70% of potential). As this was a new policy, I anticipated a gradual realization of these gains prior to reaching full potential.

Table 7: Option 4 Cost-Effectiveness Projections

Option 4 (in Thousands)										
Item / *School Year* (*SY*)	SY1	SY 2	SY 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Baseline Costs	8,294,378	8,460,266	8,629,471	8,802,061	8,978,102	9,157,664	9,340,817	9,527,633	9,718,186	9,912,550
Vetting IM	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0
Web Designer	81.04	81.04	81.04	81.04	81.04	81.04	81.04	81.04	81.04	81.04
SD Administrator PD	10.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
HQIM Convergence Survey	3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Annual Cost	8,294,800	8,460,676	8,629,881	8,802,471	8,978,512	9,158,074	9,341,227	9,528,044	9,718,596	9,912,960
Net Present Value	$67,582,510									
Benefits										
Increase in # of SOL Proficient Students	6.49	13.09	13.18	13.28	13.38	13.48	13.57	13.67	13.77	13.87
CER	$528.89									

- **Baseline Costs:** Total costs associated with baseline (see Table 4)
- **Vetting & Selecting IM:** To construct this database VDOE must annually identify and evaluate the quality of IM used in each SD. This will require VDOE design and implement methods for vetting these materials.
  - Similar to Option 2 this will cost approximately $328k for vetting, however, does not require the additional $5k for selection (Lashley-a, 2021).
- **Web Designer:** Projects the associated costs of hiring a full-time web designer to design and maintain the database. Based on figures from Indeed, the average annual salary for a web designer in Virginia is $81,037 (Indeed, 2021).
- **Division Administrator Professional Development:** Similar to PD cost items in other alternatives, little information is publicly available on the cost of this activity. However, such e orts are necessary to educate/inform stakeholders on how to use the resource. As such they should be captured in any cost estimate
- **HQIM Convergence Survey:** Similar to all new alternatives, an annual survey should be conducted to measure the efficacy of the solution. Designing this survey will cause this item to have higher upfront costs. After the first year, however, the survey can be recycled with little to no edits
- **Increased Proficiency** Using a similar method as other Options, I added my expected gains to proficiency and subtracted a baseline number of estimated proficient students. Given the lack of evidence of efficacy, at full rollout I projected this option would increase SOL proficiency by 0.8 percentage points (40% of potential). However as this was a new policy, I anticipated a gradual realization of these gains prior to reaching full potential.

Table 8: Option 5 Cost-Effectiveness Projections

Option 5 (in Thousands)										
Item/*School Year* (*SY*)	SY1	SY 2	SY 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Baseline Costs	8,294,378	8,460,266	8,629,471	8,802,061	8,978,102	9,157,664	9,340,817	9,527,633	9,718,186	9,912,550
New Non-Teaching Sta	7,925.11	7,925.11	7,925.11	7,925.11	7,925.11	7,925.11	7,925.11	7,925.11	7,925.11	7,925.11
PD Seminars	156.36	156.36	156.36	156.36	156.36	156.36	156.36	156.36	156.36	156.36
Rubric Development	5.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
HQIM Convergence Survey	3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Annual Cost	8,302,468	8,468,348	8,637,553	8,810,142	8,986,184	9,165,746	9,348,899	9,535,715	9,726,268	9,920,632
Net Present Value	$67,639,591									
Benefits										
Increase in # of SOL Proficient Students	9.74	16.36	23.07	29.88	30.10	30.32	30.54	30.76	30.98	31.20
CER	$257.22									

- **Baseline Costs:** Total costs associated with baseline (see Table 4)
- **New Non-Teaching Staff:** Projects the associated costs due to increased need for education specialists to lead PD seminars. This item uses the annual number entering teachers across all teaching assignments (2606) and the average salary of an instructional coordinator (Virginia Employment Commission, n.d.; U.S. Bureau of Labor Statistics, 2020).
  - New Sta = Total full-time staff needed * (1 - assumed percent of this need met by current capacity) * average salary = ((2606*6)/40) * 0.3 * $66290
- **PD Seminars:** The projected cost per PD seminar ranges from $20 – $60/seminar (Virginia Association for Environmental Education, n.d.). Assuming VDOE can leverage bulk pricing to reduce the per unit cost, I have held the per seminar cost at $30. Additionally, the annual number of entering teachers was projected using the same estimates as the above item.
  - Seminar Costs = of seminars * Cost per seminar * of new teachers =2 * 30 * 2606 = $156,360
- **Rubric Development:** This item projects costs associated with the HQIM rubric all seminar participants will receive. While the upfront costs of this are relatively large, the same rubric can be used with minor alterations over much of this period.
- **HQIM Convergence Survey:** Similar to all new alternatives, an annual survey should be conducted to measure the efficacy of the solution. Designing this survey will cause this item to have higher upfront costs. After the first year, however, the survey can be recycled with little to no edits
- **Increased Proficiency** Using a similar method as other Options, I added my expected gains to proficiency and subtracted a baseline number of estimated proficient students. Given the efficacy of IM PD & rubrics, at full rollout I projected this option would increase SOL proficiency by 1.8 percentage points (90% of potential). However as this was a new policy, I anticipated a gradual realization of these gains prior to reaching full potential.