COURSE OF MIND

Policy Recommendations to Activate Learning Sciences in Your State

ISTE

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Course of Mind is ISTE's learning sciences initiative. ISTE is creating resources for educators, education leaders, specialists in edtech procurement and educational policymakers who want to make learning more impactful, efficient and inclusive through a deeper understanding of the learning sciences. Through publications, podcasts, model policy and online courses, Course of Mind seeks to empower educators and leaders to understand how to use the learning sciences to build upon existing teaching practices to more fully realize the power of education for learners of any age.

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Why Do the Learning Sciences Matter for State Leaders?
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Learning sciences, a multidisciplinary field of research that brings together findings from fields like cognitive science, social science, developmental psychology and educational psychology, has fundamentally transformed what we know about why and how students grasp new knowledge and skills under specific conditions. For example, researchers have repeatedly found evidence against "learning styles" theories, which posit that individuals learn best when materials are presented in a specific manner of their preference[1]. A more robust body of evidence supports the "dual coding" theory of learning, which suggests that learning is enhanced when students engage with new content through multiple modalities (i.e. both visual and verbal)[2]

Fortunately, federal policy in recent years has moved in a direction that supports the use of evidence-based practices in schools. The Every Student Succeeds Act (ESSA) requires or incentivizes the use of federal funds to support "evidence-based" programs and activities, providing state leaders with[3] a unique opportunity to examine educational resources and classroom strategies grounded in research.

However, ESSA only goes so far as to outline different evidence "tiers," defining the types of studies that qualify as strong, moderate or promising evidence.[4] The law does not specify which fields of research states should consider when selecting evidence-based programs and activities or building educators' capacity to implement them with fidelity. Such flexibility lends itself to large variabilities in what constitutes "evidence" in each district and, consequently, which educational resources and classroom strategies educators choose to use.

[1] Willingham, D. T., Hughes, E. M., & Dobolyi, D. G. (2015). The scientific status of learning styles theories. *Teaching of Psychology*, 42(3), 266-271. https://doi.org/10.1177/0098628315589505

[2] Mayer, R. E. & Anderson, R. B. (1992). The instructive animation: Helping students build connects between words and pictures in multimedia learning. *Journal of Educational Psychology*, 84(4), 444-452. https://doi.org/10.1037/0022-0663.84.4.444

[3] Results for America. (2016). *The evidence provisions of the Every Student Succeeds Act*. Retrieved from http://results4america.org/wp-content/uploads/2016/11/ ESSA-evidence-provisions-explainer-7.22.16-Update.pdf

[4] Office of Elementary and Secondary Education. (2016). *Non-regulatory guidance: Using evidence to strengthen education investments*. Washington, D.C.: U.S. Department of Education. Retrieved from https://www2.ed.gov/policy/elsec/leg/essa/guidanceuseseinvestment.pdf

District leaders have echoed this concern. Kurt Clay, assistant superintendent at Delta County School District, stated that to truly catalyze a cultural shift toward the use of evidence-based practices, policymakers and education leaders must move away from the rhetoric of pushing educators to use "individualized instruction" or "rigorous curricula" without detailed guidance. They must make deliberate efforts to build teachers' and administrators' capacities to be more "thoughtful in their craft."[5]

To bridge this gap between federal policy and implementation of evidence-based practices, various educational organizations, including the Alliance for Excellent Education[6] and Turnaround for Children[7], have called for state leaders to strongly consider the infusion of the learning sciences into policies that govern educator quality and student learning. To support this body of work, ISTE examined the policies of 13 states that could facilitate the implementation of instructional strategies and educational resources supported by the learning sciences. ISTE developed a rubric to systematically search for a common set of indicators related to concepts in the learning sciences across several state policy areas.[8]

State leaders can use ISTE's policy scan findings (page 5) as well as state policy recommendations that stem from these findings (page 11) as a model to evaluate whether their respective state education agencies' policies could be better leveraged to support educators' understanding and application of the learning sciences. ISTE further provides a set of concrete action steps (page 20) that state leaders can take to introduce the learning sciences to their state education agencies.

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[5] K. Clay, personal communication, September 27, 2018
[6] Alliance for Excellent Education. (2019). *Science of adolescent learning.* Retrieved from all4ed.org/science-of-adolescent-learning/
[7] Turnaround for Children. (2018). *Key findings and implications of the science of learning and development.* Washington, D.C.: Turnaround for Children. Retrieved from https://www.turnaroundusa.org/wp-content/uploads/2018/02/Key-Findings-and-Implications-of-the-Science-of-Learning-Development.pdf
[8] See Appendix A for a more detailed description of the methods.

What are the learning sciences?

The learning sciences refer to a body of research focused on how the learning environment, instructional design, classroom practices and various characteristics of the learner — particularly their cognition, motivation and behavior — come together to shape the learning process in different contexts.

How do the learning sciences help educators?

The learning sciences empower educators with an understanding of both why and how students access and process information, engage with content and express what they know in varying contexts (e.g. subjects, environments, cultures). Being knowledgeable of such information can influence educators' choice of instructional strategies, design of learning environments and practices to nurture positive classroom cultures that improve student learning. Furthermore, the learning sciences can help educators assess potential reasons for student achievement gaps and thereby take effective measures in response.

Knowledge of the learning sciences can encourage teachers to question popular misconceptions that do not affect student learning, such as the identification of students' learning styles[1] or the belief that individual differences can be attributed to a dominant brain hemisphere.[9] Equipped with key findings from the learning sciences, teachers can implement better strategies such as engaging students with new content through multiple modalities.[2] They can also assess learners' prior knowledge and experiences to identify individual differences in learning.[10]

Why does ISTE care about the learning sciences?[11]

The learning sciences additionally inform educators and education leaders about how to better leverage technology to provide the best possible learning experience for students. The combination of teacher experience with findings from the learning sciences helps maximize the transformative impact technology can have in the classroom, and consequently, provides a better return on investments.

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[9] Kauffman, S. B. (2013). *The real neuroscience of creativity.* New York, NY: Scientific American. Retrieved from
https://blogs.scientificamerican.com/beautiful-minds /the-real-neuroscience-of-creativity/
[10] Lent, R. C. (2012). Background knowledge: The glue that makes learning stick. In Overcoming textbook fatigue: *21st century tools to revitalize teaching and learning.* Alexandria, VA: ASCD. Retrieved from
http://www.ascd.org/publications/books/113005/chapters/Background-Knowledge@-The-Glue-That-Makes-Learning-Stick.aspx
[11] See "Action Steps for Activating Learning Sciences in Your District" for additional resources to help state leaders familiarize themselves with the learning sciences.

Learning Sciences State Policy Scan: Key Findings

To ground state policy recommendations in existing policies, ISTE examined 13 states' policies (**New Mexico, Minnesota, Connecticut, Delaware, Iowa, Rhode Island, Tennessee, Indiana, Colorado, Nevada, Maryland, California and Texas**) that could facilitate the implementation of instructional strategies and educational resources supported by the learning sciences. These states were carefully chosen to ensure a balanced sample in terms of geographic region, enrollment size and student demographics.

Specifically, ISTE examined each state's science standards[12], teacher certification requirements, professional learning standards, subgranting processes for various ESSA Title grants, and technical assistance provided to districts in selecting evidence-based programs and activities. For each of these policy areas, ISTE examined whether the state policy references evidence-based practices, social-emotional aspects of the learning sciences, cognitive aspects of learning sciences and technology use. Additionally, given the popularity of the learning styles misconception, ISTE examined whether state policies reference this concept.[13] Below, we summarize some key findings of the policy scan.

States show a commitment to funding evidence-based programs and activities through their ESSA funds.

All states call for local education agencies (LEAs) applying for Title I-A or Title II-A funds to submit a description of the evidence behind programs and activities that they will support. All but two states (TN, MN) have similar requests for Title IV-A funds. In their ESSA plans, all states outline a plan to provide technical assistance to LEAs in selecting evidence-based programs and activities. To demonstrate compliance with federal law, states generally carry over ESSA's definition of "evidence-based practices," explaining the concept of "evidence tiers" to district stakeholders. No state in this policy scan provides explicit clarification on whether presented evidence must be grounded in the learning sciences.

States generally show a commitment to developing educators who use evidence-based practices in the classroom.

All states call for preservice teachers to demonstrate knowledge of research-based or evidence-based practices prior to certification. All but two states (IN, CO) include in their professional learning standards an expectation that inservice teachers will build proficiency in research-based or evidence-based practices.

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[12] We limited our scope to science specifically because the Next Generation Science Standards (NGSS) are grounded in frameworks supported by the learning sciences. In that limited scope, we were able to compare the NGSS against the science standards of states that do not adopt the NGSS.

[13] See Appendix for a more detailed description of the methods.

States vary in their approaches to incorporating the learning sciences within their definition of research-based or evidence-based practices.

From the policy areas examined, states are most likely to reference concepts related to the learning sciences within their teacher certification requirements. Within these requirements, all states call for preservice teachers to demonstrate competency in promoting students' sense of well-being, inclusivity, safety and support and activating their prior knowledge, life experiences and individual interests to make new content more relevant and meaningful. Only three states (MN, NM, NV) include an expectation that preservice teachers demonstrate how to anticipate and provide appropriate scaffolds to address common misconceptions.

Several states reference "learning styles" within their teacher certification requirements and professional learning standards, even though research has not found evidence to support the value of identifying them.[1] Five states (TN, RI, MN, CT, NM) call for preservice teachers to know how to cater instruction to students' individual learning styles prior to certification, whereas five states (RI, NM, CA, MD, NV) call for inservice teachers to build proficiency in catering instruction to individual students' learning styles. Furthermore, Nevada incorporates learning styles into its Title IV-A subgranting process.[14] Nevada prioritizes the use of Title IV-A funds to hire social workers and other mental health professionals who, among other duties, will "[provide] a safe and respectful learning environment for all students by ... considering the uniqueness of learning styles."

Across all policy areas examined, no state makes an explicit reference to actionable classroom strategies such as spaced practice, interleaving and retrieval practice. Only Texas briefly mentions concept mapping in its science standards, calling elementary school students to "collect and record data by ... using ... labeled drawings, writing and concept maps" during lab exercises.[15] This finding provides states with an opportunity to include examples of classroom strategies supported by the learning sciences into policy language and follow up with dedicated capacity-building efforts to help district leaders decode what constitutes evidence-based practices.

From the policy areas examined, states are least likely to reference concepts related to learning sciences within their Title I-A subgranting processes. When states do include the learning sciences concepts, they are most likely to call for districts to demonstrate how the uses of funds will promote students' sense of well-being, inclusivity, safety and support at school. Eight states (TN, CT, NM, DE, IN, CO, MD, NV) include this recommendation to use Title I-A funds to reinforce the school climate. For example, New Mexico's Title I-A application calls on LEAs to use funds "for school climate interventions ... [that] reflect[s] one of the highest three levels of evidence."[16]

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[14] Nevada Department of Education (NDE). (2017). *Request for application: Title IVA, Student Support and Academic Achievement Grant.* Carson City, NV: NDE. Retrieved from http://www.doe.nv.gov/uploadedFiles/nde.doe.nv.gov/content/Grants/titleivrfa_.pdf

[15] 19 Texas Administrative Code § 112.15 (2017)

[16] New Mexico Public Education Department (NMPED). (2018). *Title I: 2018-2019 application instructions.* Santa Fe, NM: NMPED. Retrieved from https://webnew.ped.state.nm.us/wp-content/uploads/2018/05/TI-18-19-Title-I-Application-Instructions.pdf

States rarely call for preservice and inservice teachers to build proficiency in evidence-based methods of using educational technology.

Rhode Island and Texas are the only states that call for preservice and inservice teachers to build proficiency in evidence-based methods of using educational technology. For example, the Rhode Island Professional Teaching Standards call for teachers to be knowledgeable in the "application of current research, instructional approaches and strategies, including technologies to improve student learning."[17] Other states' policies are more general in their references to technology. For example, the Iowa Teaching Standards calls for teachers to "[use] available resources, including technologies, in the development and sequencing of instruction."[18]

The Next Generation Science Standards incorporate more learning sciences compared to other state science standards.
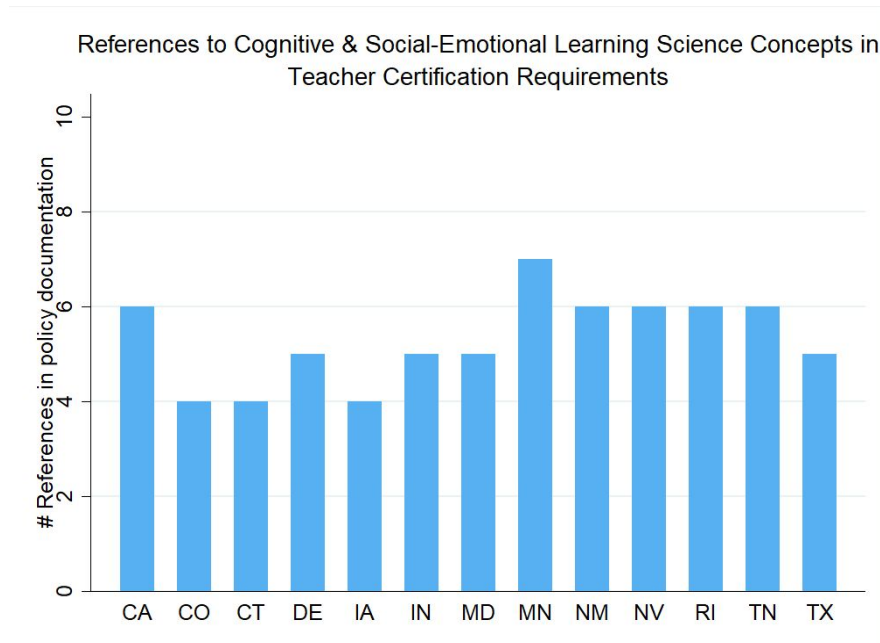
The Next Generation Science Standards incorporate more concepts related to the cognitive aspects of the learning sciences compared to science standards of non-adopting states (MN, TX, CO, NV). This is especially true for strategies such as anticipating common scientific misconceptions to provide scaffolds — referenced only by Minnesota among non-adoptees — and delivering new content through multiple modalities — referenced only by Minnesota and Texas among non-adoptees.
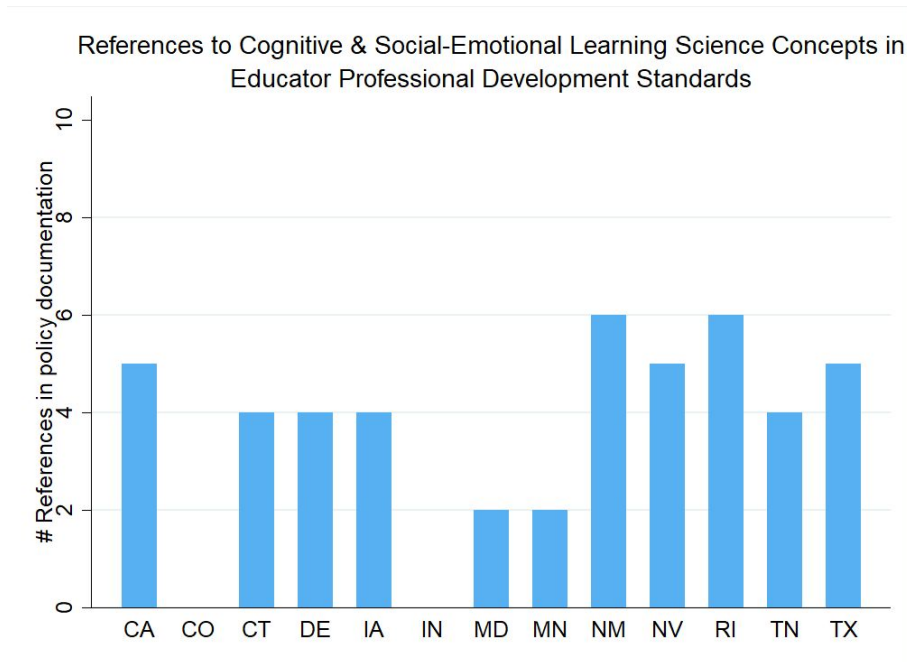
Notable States

The figures below depict, for a given policy area, how many of the eight indicators tied to cognitive and social-emotional learning science concepts each of the 13 states referenced. For a more detailed description of the indicators and the policy areas examined, refer to "Appendix: State Policy Scan Methods" on page 24.

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[17] Rhode Island Department of Education (RIDE). (2007). *Rhode Island professional teaching standards.* Providence, RI: RIDE. Retrieved from http://www.ride.ri.gov/Portals/0/Uploads/Documents/Teachers-and-Administrators-Excellent-Educators/Educator-Certification/Cert-main-page/RIPTS-with-preamble.pdf

[18] Iowa State Board of Education. (2010). *Iowa teaching standards and criteria.* Des Moines, IA: Iowa Department of Education. Retrieved from https://educateiowa.gov/sites/files/ed/ documents/IowaTeachingStandardsAndCriteria_0.pdf
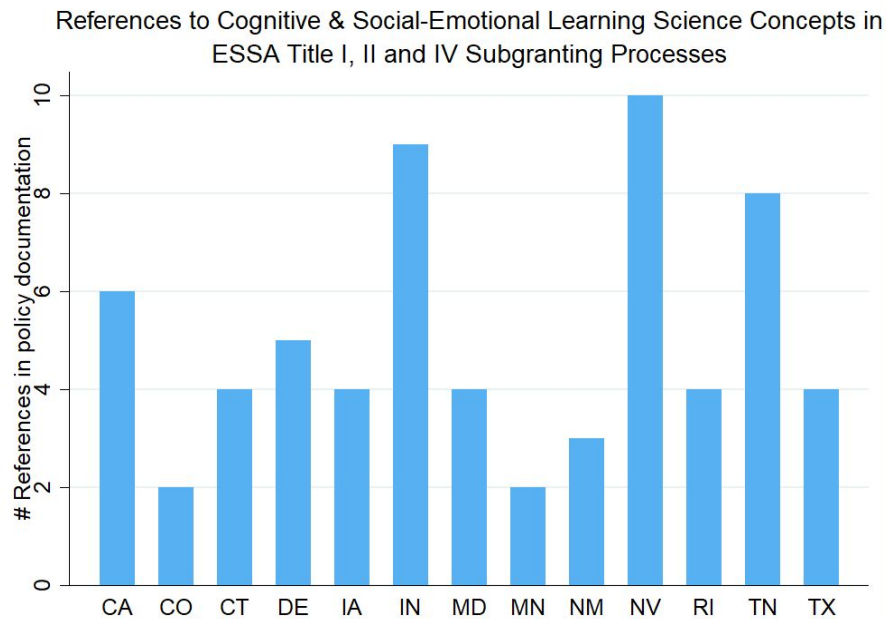
References to Cognitive & Social-Emotional Learning Science Concepts in Teacher Certification Requirements

References in policy documentation

| | CA | CO | CT | DE | IA | IN | MD | MN | NM | NV | RI | TN | TX |

Minnesota references the most concepts related to the learning sciences in its teacher certification requirements.[19]

References to Cognitive & Social-Emotional Learning Science Concepts in Educator Professional Development Standards

References in policy documentation

| | CA | CO | CT | DE | IA | IN | MD | MN | NM | NV | RI | TN | TX |

Rhode Island and New Mexico reference the most concepts related to the learning sciences in their professional learning standards.[17]

[19] Minnesota Rules § 8710.1410 (2016).

References to Cognitive & Social-Emotional Learning Science Concepts in ESSA Title I, II and IV Subgranting Processes

Nevada is a leader for policy areas related to ESSA subgranting. This occurs primarily because the state specifies that applications for Title II-A funds must be aligned to the Nevada Educator Performance Framework (NEPF).[20] The NEPF, among other things, calls for inservice teachers to develop their proficiencies in activating prior knowledge, life experiences and individual interests to make new content more relevant and meaningful, and delivering new content through multiple modalities.

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[20] Nevada Department of Education (NDE). (2018). *Nevada educator performance evaluation system.* Carson City, NV: NDE. Retrieved from http://www.doe.nv.gov/uploadedFiles/ndedoenvgov/content/Educator_Effectiveness/Educator_Develop_Support/NEPF/Tools_Protocols/NEPFTeacher_Admin_Protocolsrev.pdf

References to Cognitive & Social-Emotional Learning Science Concepts in Technical Assistance
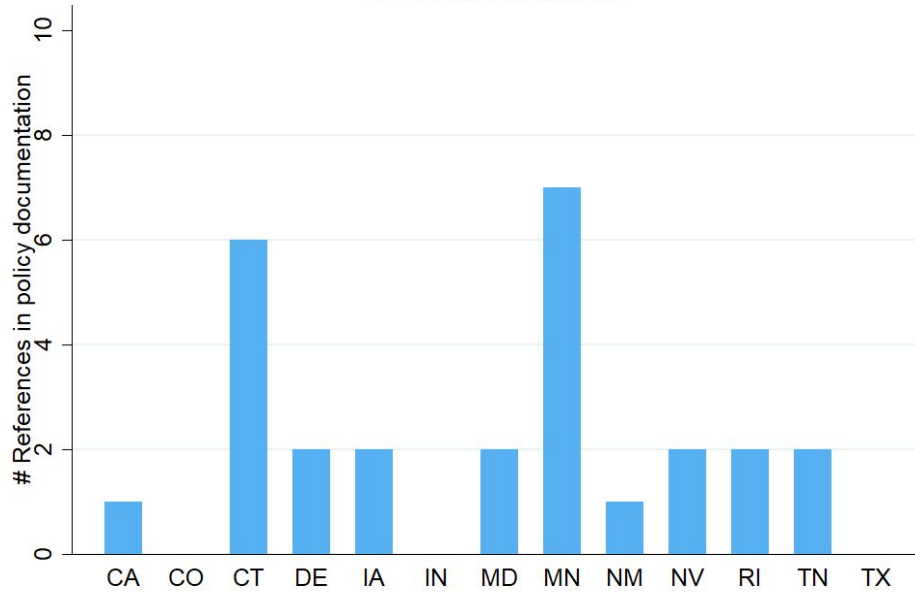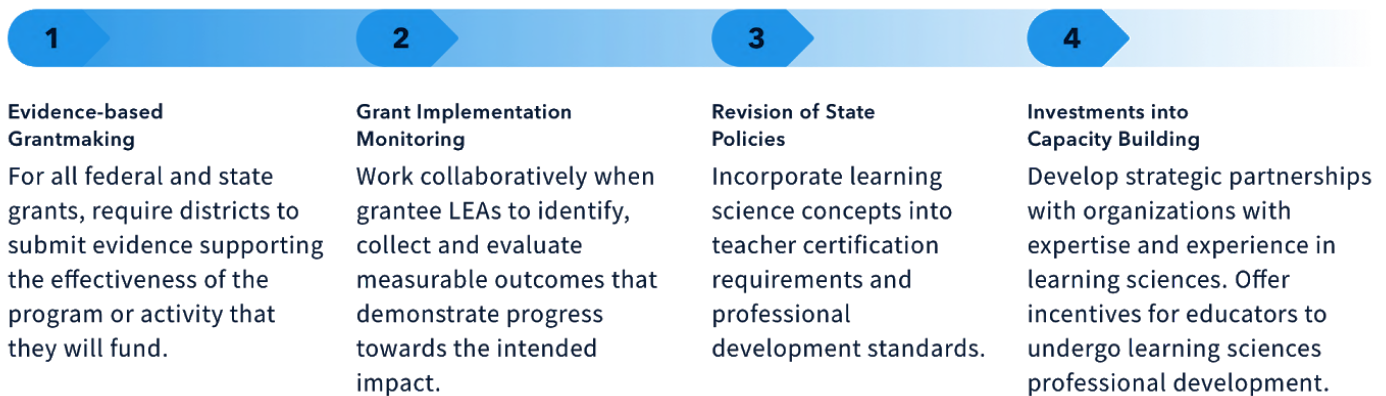
Minnesota and Connecticut lead in the technical assistance category. Connecticut partnered with universities, researchers, district leaders and educator organizations; the state developed several "Evidence-Based Practice Guides" in the areas of climate and culture, early learning, English language proficiency, mathematics, on-track graduation, reading and student/family/community engagement.[21] Each guide gives a summary of an evidence-based practice, citation of the source research literature and the corresponding ESSA evidence tier.

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[21] Connecticut State Department of Education (CSDE). (2017). *Evidence-based practice guides.* Retrieved from http://www.doe.nv.gov/uploadedFiles/ndedoenvgov/content/Educator_Effectiveness/Educator_Develop_Support/NEPF/Tools_Protocols/NEPFTeacher_Admin_Protocolsrev.pdf

State Policy Recommendations and Examples

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Findings from ISTE's policy scan demonstrate that there is an opportunity for states to support the implementation of classroom practices and educational resources supported by the learning sciences. Below, we list four policy recommendations to help address this need, as well as examples of these recommendations at work in leading states.

Learning Science State Policy Road Map

1	2	3	4
Evidence-based Grantmaking	**Grant Implementation Monitoring**	**Revision of State Policies**	**Investments into Capacity Building**
For all federal and state grants, require districts to submit evidence supporting the effectiveness of the program or activity that they will fund.	Work collaboratively when grantee LEAs to identify, collect and evaluate measurable outcomes that demonstrate progress towards the intended impact.	Incorporate learning science concepts into teacher certification requirements and professional development standards.	Develop strategic partnerships with organizations with expertise and experience in learning sciences. Offer incentives for educators to undergo learning sciences professional development.

1. States can establish a new statewide standard for evidence-based grantmaking.

First, when distributing any federal or state discretionary grant to LEAs, states can require that district leaders submit evidence supporting the effectiveness of the program or activity they will fund. The evidence tiers outlined in ESSA provide states with a good starting point for defining what types of studies qualify as evidence.

States can also go one step further by strategically prompting LEAs to consult learning sciences resources and cite them in their applications. States can recommend that the evidence included in the application to justify proposed expenditures include the learning sciences and provide links to resources on the learning sciences.[22] When distributing competitive grants, states can give preference points to LEAs that propose programs supported by the learning sciences in their applications.

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[22] See "Action Steps for Activating Learning Sciences in Your State" to view examples of resources on the learning sciences that districts are already consulting.

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The Nevada Educator Performance Framework

Title II-A of ESSA provides funds to develop high-quality educators. In its ESSA plan, Nevada specifies that "[Title II-A] [f]unds will be prioritized to focus on strategies in the following areas … Implementation of the … NEPF System."[23] The Nevada Educator Performance Framework (NEPF) references several concepts in the learning sciences, calling for inservice teachers to develop their proficiencies in activating prior knowledge, life experiences and individual interests to make learning more relevant and meaningful, and delivering new content through multiple modalities.[20]

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Tennessee Calls for Evidence-Based Professional Development

In its "Consolidated Funding Application Guide," Tennessee clarifies what types of programs and activities can be supported through federal funds. In the section concerned with ESSA Title II-A, the state provides that these funds can be used to support "[e]vidence-based professional development activities for teachers, principals, paraprofessionals, and other school leaders." Applications will also be evaluated on whether the district proposes evidence-based professional development activities.[24]

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New Mexico's Guidance on ESSA Title II-A

New Mexico provides guidance to districts regarding how to complete the state's Title II-A funding application. The guidance clarifies that districts are required to submit information on how Title II-A funds will be used to support "high-quality evidence-based educator induction and mentorship programs" or "evidence-based professional development that will help increase academic achievement by improving teacher and principal quality."[25]

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[23] Nevada Department of Education (NDE). (2017). *Nevada Department of Education: Consolidated state plan under Every Student Succeeds Act.* Carson City, NV: NDE. Retrieved from http://www.doe.nv.gov/uploadedFiles/ndedoenvgov/content/Boards_Commissions_Councils/ESSA_Adv_Group/NevadaSubmittedConsolidatedPlanFinal.pdf, NEPF/Tools_Protocols/NEPFTeacher_Admin_Protocolsrev.pdf

[24] Tennessee Department of Education (TDE). (2019). *Consolidated funding application guide.* Nashville, TN: TDE. Retrieved from https://eplan.tn.gov/DocumentLibrary/ViewDocument.aspx?DocumentKey=1496798&inline=true

[25] New Mexico Public Education Department (NMPED). (2018). *Strengthening your Title II, part A investments with a plan to increase equity.* Santa Fe, NM: NMPED. Retrieved from https://webnew.ped.state.nm.us/wp-content/uploads/2018/05/Title-II-Application-Guidance.pdf

2. States can deliberately monitor grant implementation to ensure that LEAs are using evidence-based programs and activities to improve student learning and educator quality.

Only a few states go beyond ensuring that LEAs' proposed spending of ESSA funds are compliant with the federal law (i.e. align with the appropriate tier of evidence).[26] When distributing federal or state grants, states can work collaboratively with grantee LEAs to identify, collect and evaluate measurable outcome data that demonstrate progress toward the intended impact on student learning and educator quality. States can additionally leverage their ESSA set-asides to develop evaluation mechanisms or partner with external evaluators that help determine whether grantee LEAs are on track to meet their goals.

Tennessee's Platform for Evidence-Based Decision Making

Tennessee, through its InformTN platform, offers all districts a centralized method to facilitate evidence-based decision-making when developing their improvement plans. The platform presents data regarding, among others, student achievement, chronic absenteeism and discipline, and disaggregates the data according to student subgroups and grade levels. Districts can explore this data to identify existing gaps, group these issues according to priority and propose action steps and concrete benchmarks for how the gaps will be addressed.[27] District plans are then evaluated according to the evidence justifying their action steps and benchmarks (e.g. one district justified its need for school climate programs by citing data on student discipline and absenteeism).[28] Approved districts plans are made public, and the InformTN platform's search function allows districts to see resources used by top performers in the state. Furthermore, if the state education agency finds that a particular resource is exceptionally effective and has a sound research basis, it can use the platform to share them with districts. Nate Schwartz, chief research and strategy officer at the Tennessee Department of Education, elaborated, "When [the state] has resources and we think it's a tried-and-true strategy, we [share] research in that area … [These resources] allow people to think about 'What do I do next?' once they see the data we put in front of them."[29]

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[26] Results for America. (2018). *ESSA leverage points: 50-state report on promising practices for using evidence to improve student outcomes.* New York City, NY: Results for America. Retrieved from https://results4america.org/wp-content/uploads/2018/01/RFA-ESSA-50-State-Report_final.pdf

[27] Tennessee Department of Education (TDE). (2018). *InformTN technical user guide: Components of the ePlan Suite.* Nashville, TN: TDE. Retrieved from https://www.tn.gov/content/dam/tn/education/cpm/InformTN_Technical_User_Guide.pdf

[28] Tennessee Department of Education (TDE). (n.d.). *District plan review tool.* Nashville, TN: TDE. Retrieved from https://www.tn.gov/content/dam/tn/education/cpm/district_plan_rubric.docx

[29] Kerr, S. & Schwartz, N (2019). *State education fellowship webinar: InformTN demo* [Video file]. Retrieved from https://drive.google.com/file/d/1sPm1xvb76FK_NCkWWLeehsSpuouoeyoQ/view

Utah Monitors State Grant Implementation

Utah's Digital Teaching and Learning (DTL) grant program provides funds for LEAs to improve their technology infrastructure and expand professional learning opportunities. In applying for funds, LEAs must submit a three-year plan describing their long-term, immediate and direct outcomes. The Utah State Board of Education will annually evaluate grantee LEAs' progress against these intended outcomes and provide additional supports as necessary.

3. States can include specific concepts in the learning sciences within teacher certification requirements and professional learning standards.

States can specifically support district-level implementation of the learning sciences by ensuring that their policy documents are up to date with current research. Teacher certification requirements and professional learning standards dictate which educator preparation and professional learning programs the state board will recognize as meeting the needs of their students. Therefore, it's important for these policies to be specific in outlining which competencies and skills are expected from educators.

Classroom strategies such as spaced practice[30], interleaving[31], retrieval practice[32] and concept mapping[33] are supported by rigorous research evidence. States can revise their teacher certification requirements to require that preservice teachers demonstrate knowledge of these and other well-supported strategies prior to becoming licensed. States can similarly revise their professional learning standards to require that inservice teachers receive adequate training on these practices.

Learning styles are a concept that has been discredited repeatedly in the research community.[1] States can revise their teacher certification requirements and professional learning standards to remove language referring to the identification of and individualizing instruction to students' unique learning styles. Such language can be replaced by a call for both preservice and inservice teachers to know how to engage students with new content through multiple modalities. This strategy, grounded in the dual coding theory of learning, has a robust research basis.[2]

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[30] Kang, S. H. K. (2016). Spaced repetition promotes efficient and effective learning: Policy implications for instruction. *Policy Insights from the Behavioral and Brain Sciences*, 3(1), 12-19. https://doi.org/10.1177/2372732215624708

[31] Carvalho, P. F. & Goldstone, R. L. (2014). The benefits of interleaved and blocked study: Different tasks benefit from different schedules of study. *Psychonomic Bulletin and Review*, 2 2(1), 281-288. https://doi.org/10.3758/s13423-014-0676-4

[32] Agarwal, P. K., Roediger, H. L., McDaniel, M. A., & McDermott. K. B. (2018). *How to use retrieval practice to improve learning.* St. Louis, MO: Washington University in St. Louis. Retrieved from http://pdf.retrievalpractice.org/RetrievalPracticeGuide.pdf

[33] Chang, K., Sung, Y., & Chen, I. (2002). The effect of concept mapping to enhance text comprehension and summarization. Journal of Experimental Education, 71(1), 5-23. https://doi.org/10.1080/00220970209602054

To ensure that student learning experiences are enhanced through active uses of technology, as recommended by the U.S. Department of Education's [2017 National Education Technology Plan](#)[34], states can hold educators accountable for effective uses of digital tools. Where references to technology appear within teacher certification requirements and professional learning standards, states can specify that preservice and inservice teachers should develop their proficiency in "evidence-based" uses of technology. Some states have approached this goal by adopting, adapting or endorsing the [ISTE Standards for Educators](#), an evidence-based framework that calls for teachers to "stay current with research that supports improved student learning outcomes, including findings from the learning sciences."

While no state has developed an ideal set of teacher certification requirements and professional learning standards, we list below examples of a few noteworthy states.

Concept Mapping in Texas

Texas briefly mentions concept mapping in its science standards, calling elementary school students to "collect and record data by ... using ... labeled drawings, writing and concept maps" during lab exercises.[15]

Iowa Calls for Connections to Prior Knowledge

The [Iowa Teaching Standards](#) call for teachers to connect new content to "students' prior knowledge, life experiences and interests." This approach is more grounded in research than those that call for teachers to identify and individualize instruction to students' learning styles.[18]

The ISTE Standards in Rhode Island

The [Rhode Island Professional Teaching Standards](#) call for teachers to be knowledgeable in the "application of current research, instructional approaches and strategies, including technologies to improve student learning."[17] The Rhode Island Department of Education has also officially endorsed the [ISTE Standards](#) to guide LEAs' thinking around "digital age skills and pedagogical insights educators need to teach, work and learn."[35]

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[34] Office of Educational Technology (OET). (2017). *Reimagining the role of technology in education: 2017 National Education Technology Plan update.* Washington, D.C.: U.S. Department of Education. Retrieved from https://tech.ed.gov/files/2017/01/NETP17.pdf
[35] Rhode Island Department of Education. (2018). *Technology literacy.* Retrieved from http://www.ride.ri.gov/InstructionAssessment/InstructionalInitiativesResources/TechnologyLiteracy.aspx

4. States can invest in capacity-building efforts to help educators apply the learning sciences.

Finally, states can support district-level implementation of the above adjustments to teacher certification requirements and professional learning standards by developing strategic partnerships with organizations with expertise and experience in the learning sciences that provide opportunities for educators to learn about specific classroom strategies. States can further facilitate such partnerships by officially recognizing the professional learning program and offering continuing education units (CEUs), toward specific endorsement areas or other types of educator incentives upon completion.

District efforts to introduce learning sciences into schools

The below excerpts from ISTE's district case study series showcase how some LEAs across the country are leveraging strategic partnerships and educator incentivization to introduce learning sciences to their schools.

Frederick County Public Schools (FCPS)

Meg Lee is the supervisor for the Office of Advanced Academics at this Maryland school district. Specialists recruited by the office have primarily provided professional learning opportunities for teachers of high-achieving students. Lee realized that continuing this practice could widen the district's achievement gap by overlooking students whose potential as high-achievers were inhibited by environmental factors such as poverty, discrimination or cultural barriers. To more equitably serve all students, district leaders took deliberate steps to transform the specialists into ambassadors for learning sciences. District leaders partnered with the Center for Transformative Teaching and Learning (CTTL) to provide learning sciences-focused professional learning to the specialists. The specialists then translated what they learned into actionable instructional strategies and communicated those practices to the broader audience of FCPS principals and teachers, not just the ones working with high-achieving students.

Delta County School District (DCSD)

Kurt Clay is the assistant superintendent of this Colorado school district. To maintain the recent positive momentum in student achievement and help administrators select high-quality classroom resources, Clay became interested in the programs offered by CTTL that focus on practical classroom strategies grounded in learning sciences research. Led by principals and assistant principals, Delta conducted a districtwide book study on Neuroteach by CTTL's Glenn Whitman and Ian Kelleher. All teachers will follow up by completing Track One of the Neuroteach Global course, which discusses classroom design, classroom culture and student/teacher mindsets. Superintendent Cayrn Gibson embedded Neuroteach Global into her 2018-2019 districtwide goals to ensure that the program could be implemented seamlessly. Delta's leaders additionally incentivized participation in the program by permitting teachers to use Neuroteach Global toward professional learning credits required to qualify for a salary lane change.

District of Columbia Public Schools (DCPS)

Leaders in the nation's capital consulted resources like the Next Generation Science Standards as well as various experts in the learning sciences to renew their vision for what effective classroom instruction looks like. DCPS leaders also partnered with research organizations like Mathematica, who identified DCPS teachers who were "beating the odds" by consistently showing high student achievement despite demographic disadvantages. Mathematica interviewed these high-performing teachers and recorded their classroom proceedings to derive common practices shared among them that were supported by learning sciences literature. What resulted was the DCPS Essential Practices, a core set of evidence-based strategies that all teachers are expected to know and apply. For example, teachers are expected to make new content more meaningful for students by making explicit connections to prior knowledge and experiences. Teachers are also expected to present content using multiple modalities, such as verbal explanations, visual representations and worked examples. Teachers' alignment to the Essential Practices is reflected in their annual evaluation.

Washoe County School District (WCSD)

This Nevada school district has partnered with the Collaborative for Academic, Social and Emotional Learning (CASEL) to support students' social-emotional learning (SEL). District leaders ensured a systemic integration of evidence-based SEL into existing programs through a districtwide adoption of SEL standards, providing opportunities for teachers and administrators to examine how the SEL standards align to the state academic standards, and conducting annual surveys to identify specific SEL skills where students require the most support.

States can also fund these partnerships by turning a portion of an ESSA state set-aside into a competitive grant opportunity, encouraging districts to propose evidence-based programs or activities that would lead to educators' increased understanding and application of the learning sciences. The set-aside funds can also be used to build the internal capacity of the state education agency to support districts in finding, selecting and implementing strategies grounded in the learning sciences (e.g. developing state-recommended lists of resources).

Connecticut's Evidence-Based Practice Guides

In partnership with universities, researchers, district leaders and educator organizations, Connecticut developed several "Evidence-Based Practice Guides" in the areas of climate and culture, early learning, English language proficiency, mathematics, on-track graduation, reading and student / family / community engagement. Each guide gives a summary of an evidence-based practice, citation of the source literature and the corresponding ESSA evidence tier.[21] Ohio takes a similar approach by providing LEAs with a clearinghouse of evidence-based programs vetted by the Ohio Department of Education.[36]

Nevada Competitively Distributes ESSA State Set-Aside Funds

Nevada turned a portion of its Title I-A state set-aside into competitive grants and distribute funds to support districts seeking to "provide evidence-based professional development to strengthen school and district capacity to make data-informed decisions that drive strong school outcomes and prepare students for success in college, community and career" and "use rigorous education data and research to identify and select strong evidence-based interventions, strategies and activities that meet the needs of the school and community."[37]

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[36] Ohio Department of Education. (n.d.). *Ohio's evidence-based clearinghouse.* Retrieved from https://essa.chrr.ohio-state.edu/home
[37] Nevada Department of Education (NDE). (2018). *Consolidated application: Title I, 1003(a) and Title IV A federal allocations.* Carson City, NV: NDE. Retrieved from http://www.doe.nv.gov/uploadedFiles/nde.doe.nv.gov/content/Grants/FY18ConsolidatedApplicationgrantrev.pdf

Conclusion: Action Steps for Activating the Learning Sciences in Your State

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ESSA [requires or incentivizes](#) the use of federal funds to support "evidence-based" programs and activities.[3] Thus, federal law provides state leaders with a unique opportunity to catalyze critical conversations about the role of the learning sciences in improving educator quality and student learning experiences. In this final section, ISTE recommends specific action steps for state leaders to put learning sciences at the forefront of decisions regarding professional learning, procurement and other relevant operations of the state education agency (SEA).

1. Build Knowledge:

Review a variety of resources to build your own knowledge about the learning sciences. ISTE provides a starter kit of helpful fact sheets, websites, books and research literature. State leaders can also consult ISTE's case study series that examines four districts across the country that are already systematically engaging with the learning sciences.

I would like to learn more about the basics of learning science.		
TITLE OF RESOURCE	**PUBLISHING ORGANIZATION**	**RESOURCE TYPE**
[The Science of Learning](#)	Deans for Impact	Fact sheet
[Science of Learning and Development](#)	Turnaround for Children	Report
[Science of Adolescent Learning](#)	Alliance for Excellent Education	Website
[Neuroteach](#)	CTTL	Book
[How People Learn II](#)	NASEM	Book
[Learn Better](#)	The Learning Agency	Book

I would like to learn about classroom practices supported by learning science.		
TITLE OF RESOURCE	**PUBLISHING ORGANIZATION**	**RESOURCE TYPE**
[Course of Mind](#)	ISTE	Website
[Effective Learning Techniques](#)	Assoc. For Psychological Science	Literature Review
[How to Use Retrieval Practice](#)	Washington U. in St. Louis	Report
[How Learning Happens](#)	Edutopia	Video playlist
[Introduction to the Learning Sciences](#)	Digital Promise	Website
[Six Strategies for Effective Learning](#)	The Learning Scientists	Website
[Applications for Psychological Science](#)	American Psychological Assoc.	Website

I would like to learn about assessment and feedback strategies supported by learning sciences.		
TITLE OF RESOURCE	**PUBLISHING ORGANIZATION**	**RESOURCE TYPE**
Assessment and the Learning Brain	CTTL	Blog post
Classroom Assessment and Student Learning	Educational Testing Service	Report
How to Use Grading to Improve Learning	ASCD	Book

I would like to learn about how climate & culture contribute to student learning.		
TITLE OF RESOURCE	**PUBLISHING ORGANIZATION**	**RESOURCE TYPE**
Social and Emotional Learning Impact	CASEL	Website
What We Know about Learning Mindsets	Mindset Scholars Network	Report

I would like suggestions on using evidence to guide my procurement decisions.		
TITLE OF RESOURCE	**PUBLISHING ORGANIZATION**	**RESOURCE TYPE**
Better Edtech Buying for Educators	ISTE	Report
Using ESSA to Fund Edtech	ISTE	Report
The Evidence Provisions of ESSA	Results for America	Infographic

2. Look for Quick Wins:

As you review these resources, brainstorm the path of least resistance for your state. How could you get a "quick win" by deliberately folding learning sciences into ongoing work? For example, could you start by adjusting processes completed on a regular basis, such as revising district applications for federal and state grant funds?

3. Seek Influencer Buy-In:

It's important to seek buy-in from key decision-makers whose support would seamlessly integrate learning sciences into existing processes. Identify innovative and influential decision-makers within the SEA — such as the deputy secretary, chief of staff, ESSA title directors, federal programs directors, research directors and educational technology directors — who would be excited to integrate learning sciences into ongoing work.

4. Propose Integrated Strategies:

Present your ideas regarding how learning sciences could support the state's ongoing work to the personnel identified in step 3. Again, pay close attention to how you frame your argument. SEAs are often juggling several initiatives and will not have sufficient time or resources to devote to an entirely new one. Instead, highlight how learning sciences may form the foundation of how you think about your initiatives. For example, when speaking to district leaders, Meg Lee, supervisor for the Frederick County Public Schools Office of Advanced Academics, made sure to emphasize that "[Investing in learning science] isn't anything new. This is just a way to do the things that we are already doing — improving educator quality and student learning experiences — in a more efficient way."[38]

5. Define Next Steps:

Collaborate with this group of state leaders to identify the next steps. Refer to the policy recommendations from the previous section for ideas. Could federal and state grant applications be modified to include "nudges" for district leaders to consult resources on the learning sciences? Could the state rethink how grant implementation is monitored? How can the state work with LEAs to incentivize professional learning on the learning sciences? Do the state's teacher certification requirements and professional learning standards require an audit to identify where the learning sciences could be introduced?

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[38] M. Lee, personal communication, February 20, 2019

Acknowledgments

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The International Society for Technology in Education (ISTE) is a nonprofit organization that works with the global education community to accelerate the use of technology to solve tough problems and inspire innovation. Our worldwide network believes in the potential technology holds to transform teaching and learning. ISTE inspires the creation of solutions and connections that improve opportunities for all learners by delivering: practical guidance, evidence-based professional learning and virtual networks, thought-provoking events and the ISTE Standards, a framework for rethinking education and creating innovative learning environments. The ISTE Annual Conference & Expo is one of the world's most influential edtech events, attracting over 24,000 attendees in 2018. For more information on ISTE resources or to schedule a call with an ISTE state policy expert, please reach out to advocacy@iste.org.

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Appendix: State Policy Scan Methods

In 2018, Results for America reviewed the extent to which state ESSA plans promoted the use of evidence-based practices.[26] The top eight states identified by their report included **New Mexico**, **Minnesota**, **Connecticut**, **Delaware**, **Iowa**, **Rhode Island**, **Tennessee** and **Indiana**. ISTE analyzed the same group of states to determine whether their leaders are leveraging this commitment to evidence-based practices as a stepping stone to also incorporate the learning sciences into their policies. Because these states exemplify some of the most progressive policies regarding evidence-based practices, we believed that their policies may additionally serve as a foundation for model state policies that emphasize the learning sciences. Our analysis additionally included **Texas and California** to examine whether states serving the greatest number of students are supporting them with policies that incorporate principles from the learning sciences. Finally, we included **Maryland, Colorado and Nevada**, as districts from these states were included in ISTE's case studies as examples of those already engaging with the learning sciences.

This group of 13 states provide a balanced sample in terms of geographic region and student enrollment and demographics:

- Three states represent the Midwest (MN, IA, IN), two are from the Northeast (RI, CT), four are from the South (DE, TN, TX, MD) and four are from the West (CA, NM, CO, NV).
- Six states lie below the median K-12 enrollment size of 696,833 students (DE, RI, NM, IA, CT, NV), whereas seven lie above (MN, TN, IN, TX, CA, CO, MD).
- Six states have free and reduced-price lunch (FRPL) rates below the national median of 45 percent (CT, MN, RI, IA, CO, MD), while seven are above (IA, DE, TX, CA, TN, NM, NV).
- Our states are skewed toward those with more students of color than the median rate of 38 percent. Four states lie below (IA, TN, MN, IN), while nine are above (RI, CT, DE, CA, TX, NM, CO, MD, NV).

DATA COLLECTION

To ground state policy recommendations in existing policies, ISTE examined these 13 states' policies that could facilitate the implementation of instructional strategies and educational resources supported by the learning sciences.

Specifically, ISTE examined each state's science standards, teacher certification requirements, professional learning standards, subgranting processes for various ESSA grants (Titles I-A, II-A and IV-A) and technical assistance provided to districts in selecting evidence-based programs and activities.

Within each of these policy areas, ISTE examined whether each state's corresponding policy document references the following set of indicators:

- Evidence-Based Practices
    - Does the state policy broadly call for the use of evidence-based instructional practices?
    - Does the state policy call for the use of evidence-based instructional practices with English language learners?
    - Does the state policy call for the use of evidence-based instructional practices for students with an Individualized Education Program (IEP)?
- Social-Emotional Learning
    - Does the state policy call for fostering a sense of well-being, inclusivity, safety and support?
    - Does the state policy call for building motivation, interest, self-efficacy and persistence?
- Cognition
    - Does the state policy call for pushing beyond simple recall of content, including hands-on learning opportunities?
    - Does the state policy call for catering instruction to the appropriate developmental stage?
    - Does the state policy call for catering instruction to interests, life experiences or prior knowledge to make new content more relevant and meaningful?
    - Does the state policy call for anticipating misconceptions and providing appropriate scaffolds to address them?
    - Does the state policy call for delivering content through multiple modalities?
    - Does the state policy call for strategies such as retrieval practice, spaced practice, interleaving and concept mapping?
- Other Areas of Interest
    - Does the state policy reference learning styles?
    - Does the state policy call for the use of technology?

For each of these indicators, ISTE evaluated whether:
- The state policy makes no reference to the concept.
- The state policy references the concept, but does not specify for its execution to be grounded in evidence.
- The state policy references the concept and explicitly calls for its execution to be grounded in evidence.

Data collection was completed in January 2019. For the full rubric and data, please contact courseofmind@iste.org.