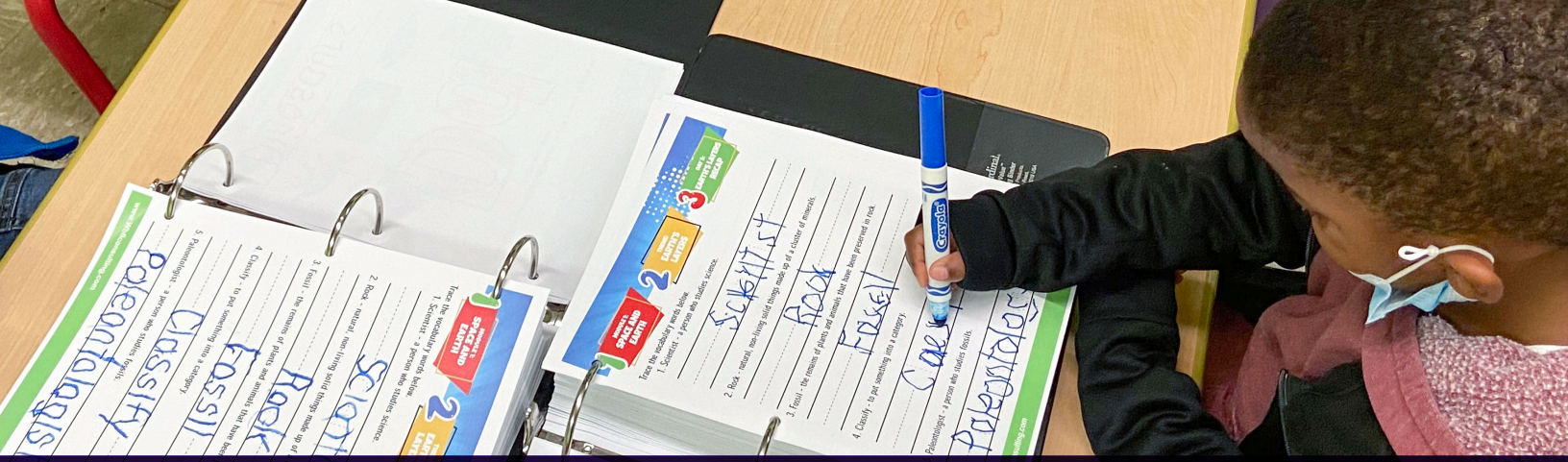

All Aboard the STEAM XPRESS!

EVALUATION REPORT

FEBRUARY 2022

WBF Global is a technology-based, creative curriculum company that provides innovative instructional systems for foundational education through science, technology, engineering, the arts, and math (STEAM). As part of WBF Global's mission to provide competitive, affordable, diversified, foundational learning platforms to entities dedicated to the instructional fortitude of early childhood education, the All Aboard the STEAM XPRESS (AASX) curriculum was developed.

AASX was envisioned by Dr. Candice Pittman, Chief Executive Officer of WBF Global. Driven by her passions for education and for children, Dr. Pittman sought to develop a curriculum that created a holistic, inclusive foundation for children's learning and would positively impact children's cognitive development and school readiness.

In turn, WBF Global established the AASX curriculum to establish a foundation for improved literacy and school readiness while ensuring inclusive, quality education and promoting lifetime learning. The premise and desired outcomes of AASX align with WBF Global's vision of a world where innovative excellence and foundational learning is a standard.

As AASX began to be piloted in classrooms across Mississippi starting in June 2021, WBF Global engaged Luminary Evaluation Group, an independent evaluator, to assess the degree to which the curriculum engages learners, impacts educators, and is scalable. This report assesses WBF Global's All Aboard the STEAM XPRESS Curriculum.

Key observations from the evaluation are presented in **FIGURE 1**.

FIGURE 1 Summary of Observations

Observation 1

The AASX curriculum provides young children with strong foundational understandings of STEAM concepts.

Observation 2

AASX offers an easy-to-understand, enjoyable introductory STEAM curriculum for early childhood educators to deliver and personalize to fit their unique teaching style.

Observation 3

AASX is an innovative, replicable, and scalable model that offers a solution to early learning organizations seeking ways to strengthen their approach to STEAM content delivery.

LUMINARY EVALUATION GROUP, LLC

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Introduction

AASX was designed to create positive, lifetime learning outcomes for early learners by introducing them to STEAM content and by increasing early childhood educators' comfort with and confidence in delivering STEAM content.

AASX was developed from a foundation of evidence-based research. Studies suggest that toddlers have a much greater capacity for scientific reasoning than traditionally was assumed.[1] Associations have been demonstrated between children's exposure to math and science early in their education and strong holistic academic performance later in their education.[2,3,4]

Yet, early childhood educators report that they experience barriers to delivering high-quality STEAM content. With a dearth of STEAM-related professional development and training opportunities available, educators lack the knowledge and support to effectively deliver STEAM content.[5] AASX presents an innovative solution to this problem.

AASX breaks down modules into simple, easy-to-use sections. Each learning module is accompanied by a module overview, theme goals; instructional schedule; curriculum web; key theme vocabulary; and a song of the day. Daily components highlight fundamentals of the lesson and learning objectives provide goals for what educators should be helping children to understand or do by the end of the lesson. Related reading to accompany the lesson is suggested.

Each lesson provides a related learning activity ("applied learning experience") and challenge to stimulate critical thinking and problem-solving. Each module includes instructions for educators on any necessary preparation. Further, procedures are outlined so that educators can guide children in how to solve the learning activity. Each lesson contains questions of the day, which add another tool to educators' toolkit in delivering the content.

AASX was developed from a body of social constructivist learning theory research. With a focus on constructivist principles, the curriculum was intentionally designed to promote children's engagement in hands-on, creative exploration and construction to develop understanding and create meaning.[6,7]

When toddlers explore their environment, their growing brains seek to make meaning from the situations they encounter. Toddlers' process of meaning-making does not solely come from an instructor, but from what they learn from their experimentation. By leveraging toddlers' ability to self-teach through exploration, toddlers also learn how to solve problems and think critically.

AASX was first piloted in June 2021 at Kids Are Kids Too in Ridgeland, MS and Children's Educare Day Care in Jackson, MS. The pilot has expanded to additional classrooms for the 2021–2022 school year. At the time of writing, in February 2022, 48 schools or centers across six organizations have implemented the AASX curriculum. Across 42 classrooms, over 475 children have engaged or are currently engaging with the AASX curriculum. Organizations currently using the AASX curriculum include Delta Health Alliance, Friends of Children of Mississippi, Inc., and the Laboratory Child Development Center of Hinds Community College.

All Aboard the STEAM XPRESS Journeys in STEAM Journal

Curriculum Outcomes, Goals & Strategies

As stated above, the intended outcome of the AASX curriculum is to expose early learners to STEAM concepts in a way that enhances school readiness and expands their cognitive development. A dual function of the AASX curriculum is to familiarize early childhood educators with STEAM concepts and deliver advanced concepts in an accessible and easy-to-understand format. Promoting professional development in STEAM concepts for early childhood educators can increase educators' comfort and confidence in delivering STEAM content, which can positively impact the quality and breadth of content those educators deliver to future children throughout their careers.

AASX seeks to achieve this outcome by reaching these goals using the associated strategies:

Goal 1

To introduce pre-kindergarten and kindergarten-aged children to STEAM concepts to provide inclusive, quality education and improve school readiness. This goal will be achieved by:

- Engaging children in a holistic curriculum which marries preparatory STEAM concepts with foundational aspects of early learning (such as tracing, coloring, the alphabet, and play)
- Providing a curriculum rooted in constructivism, which gives educators the tools to guide children in expanding their critical thinking and problem-solving skills

Goal 2

To provide teachers with ongoing professional development and coaching opportunities as they develop their practice and comfort with the delivery of quality STEAM instruction. This goal will be achieved by:

- Evaluating educators' and coaches' self-efficacy in delivering STEAM content
- Providing initial curriculum training to educators, supported by a Curriculum Framework, Curriculum Implementation Guide, and Teacher's Implementation Guide
- Engaging coaches to support educators in teaching the curriculum
- Providing educators with ongoing professional development through a digital platform

The AASX for Preschool curriculum has ten modules which are broken down into daily content and activities for educators to present. The AASX Preschool curriculum modules are described in **TABLE 1**.

TABLE 1 Curriculum Modules and Core Concepts

MODULE	CONCEPTS
Space and Earth	• Earth's systems • Human impacts on earth • Space
Plants and Animals	• Five senses • Living and non-living things • Life cycles
Agriculture	• Farming and soil cultivation for growing crops • How animals provide food, clothing, and other products • Farm-to-table food-production process
All About Weather	• Sun and moon in relation to weather • Weather patterns
Chain Reactions	• Foundation for chemistry and physics knowledge • Physical properties of materials • Scientific inquiry for investigations
Creative Minds	• Music, dance, theatre, media, and visual arts • Explore creative expression • Explore how arts play critical role in innovation, design, and development of objects and structures
Money Matters	• Foundation for mathematics • Financial literacy concepts • Foundation for understanding money, its value, and how it is used
Motion, Gravity, and Machines	• Simple machines • Cause and effect
Engineering Structures	• Introduction to engineering design • Problem-solving, critical thinking, and creative skills to design and develop models of objects and structures
World of Technology	• Origins of technology • Technological tools used to make life better • Introduction to computational thinking • Basic coding concepts

The AASX curriculum is based upon learning and development standards and objectives adapted from reputable standardizing bodies, such as the Mississippi Early Learning Standards for Infants through Four-year-old Children, NAEYC Early Learning Program Accreditation Standards and Assessment Items, Next Generation Science Standards, and National Arts Standards.

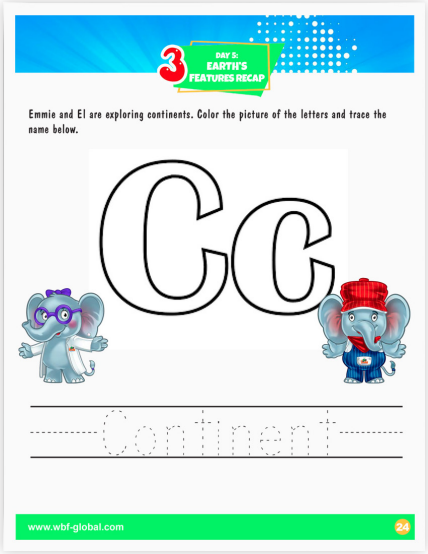
TABLE 2 Learning Topics, Objectives, and Standards

CONCEPTS	LEARNING TOPICS
Earth and Space Science	• Earth and Space Phenomena • Earth's Systems • Earth and Human Activity
Life Science	• Understanding Five Senses • Life Cycle • Living vs. Non-Living Things
Physical Science	• Objects and Materials • How and Why Things Fall • Other Forces • Energy
Scientific Inquiry	• Ask Questions and Define Problems • Construct Explanations • Plan and Carry Out Investigations • Analyze and Interpret Data • Draw Conclusions • Communicate Results
Laboratory Basics	• Science Laboratory Safety • Science Tools
Technology	• Technological Tools • Coding Concepts • Technology Basics • Other Technology Topics
Engineering Design	• Engineering Basics • Explore a Model • Design a Model • Build a Model • Test a Model • Evaluate a Model
Theater Art	• Create Artistic Ideas and Work • Perform Artistic Work • Respond to Artistic Work • Connect with Artistic Work
Visual Art	• Create Artistic ideas and work • Present Artistic work • Respond to Artistic Work • Connect with Artistic Work
Dance Art	• Create Artistic Ideas and Work • Perform Artistic Work • Respond to Artistic Work • Connect with Artistic Work
Music Art	• Create Artistic Ideas and Work • Perform Artistic Work • Respond to Artistic Work • Connect with Artistic Work
Media Art	• Create Artistic Ideas and Work • Produce Artistic Work • Respond to Artistic Work • Connect with Artistic Work
Mathematics	• Counting and Cardinality • Operations and Algebra • Measurement and Data • Geometry • Money and Finance

Young learners are shepherded through the curriculum by Emmie and El, the conductors of the STEAM XPRESS.

Emmie the Scientist

El the Transportation Engineer



Journal Worksheet: Emmie and El lead children on an exploratory journey which introduces advanced STEAM concepts while building age-appropriate skills, such as letters, spelling, and tracing.

Journeys in STEAM Journal Binder: Educators are encouraged to provide children with a binder to store their 350-page journal. Children can remove pages to work on new assignments and then replace the pages in the binder for later reference. At the start of Week 1, Emmie the Scientist welcomes learners to their first module of the AASX for Preschool curriculum, *Earth's Layers*.

Evaluation Methodology

The research questions outlined in **TABLE 3** guided the evaluation:

TABLE 3 Research Questions

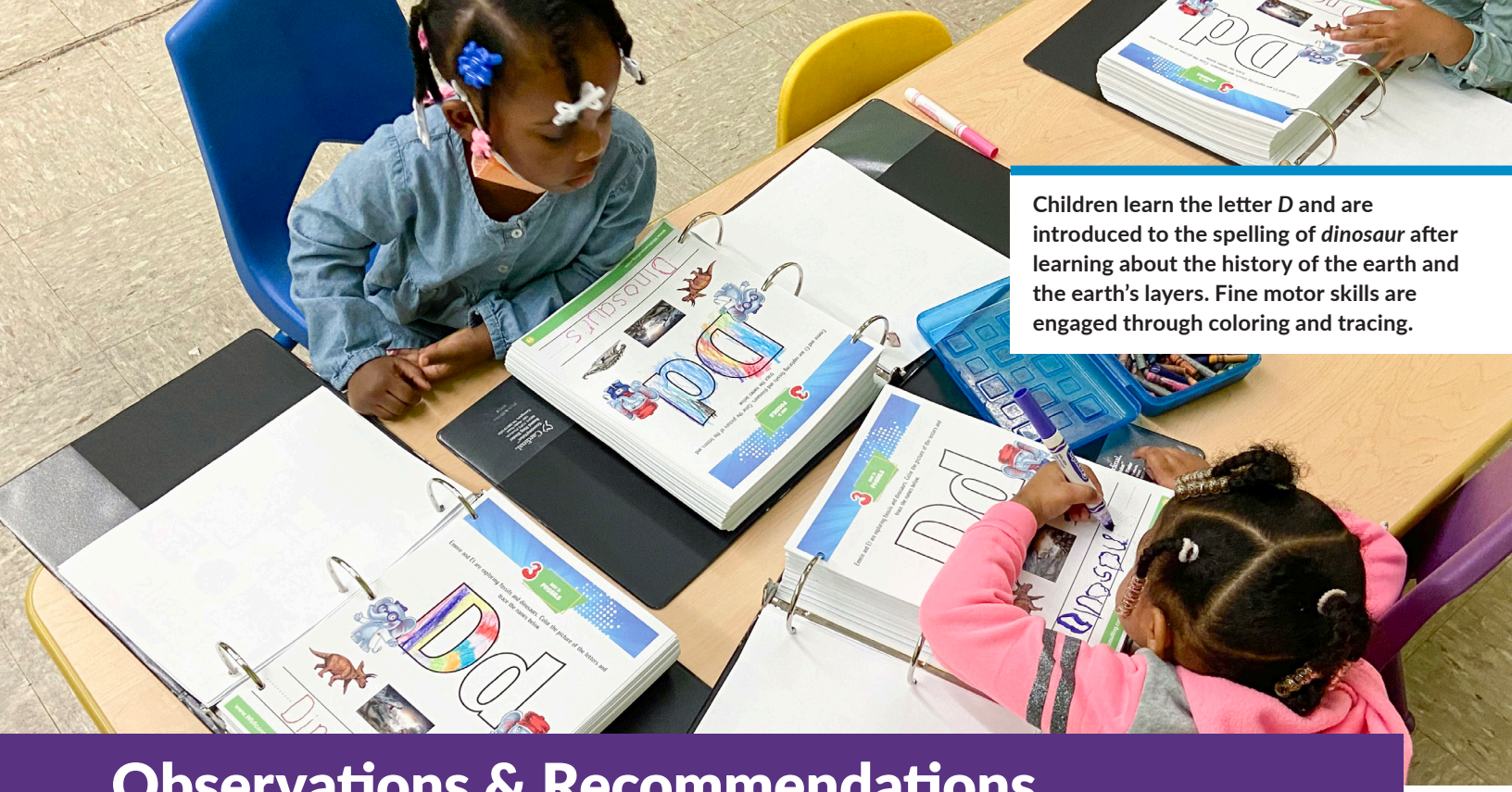
STUDENT ENGAGEMENT	
SE-1	How has the STEAM XPRESS curriculum impacted students' knowledge in and interest toward STEAM-related subjects?
SE-2	How could the curriculum potentially impact students' assessment scores in STEAM-related subjects?
INSTRUCTOR IMPACT	
II-1	How has this curriculum helped teachers to improve their instructional practices?
II-1	How is the curriculum helping to increase teachers' confidence and self-efficacy in delivering effective STEAM instruction?
SCALABILITY & REPLICABILITY	
SR-1	What opportunities are there for continued model development?
SR-2	What "scale-ready" internal and external factors exist to support sustainable growth?

To prepare this evaluation, Luminary Evaluation Group collected artifacts and conducted four qualitative interviews and one focus group, comprised of six participants. Interview and focus group participants included educators, coaches, administrators, and landscape experts. Data collected was analyzed based on frequency of occurrence and potential impact (positive or negative) on the child care program environment and stakeholders, with a focus on child-level and educator-level impact, even if just with anecdotal data. Documents, reports, surveys, curriculum samples, and assessment data generated and collected by WBF Global were also analyzed.

Two levels of content analysis were performed on the interviews. First, all interviews were manually reviewed to determine frequently used terms and words. Second, responses were reviewed again to identify overall patterns and themes that were consistent amongst interviews. Outlier responses were also considered when they were potentially relevant to the assessment of the overall effectiveness of the work, based on Luminary Evaluation Group's experience in project design, development, and implementation as well as industry best practice. At least two Luminary team members assessed all interview notes—the interviewer and one other independent team member. The observations and recommendations for WBF Global can be found in the following section.

The following data types were collected and analyzed:

- Documents and artifacts generated during concept development and initial implementation. The documents reviewed include:
  - WBF Global Business Documents: Business Plan, SWOT Analysis
  - AASX Educators' Guides: Curriculum Framework; Teacher's Guide; Curriculum Implementation Guide
  - Scholarly articles on STEAM education, early childhood education, and theories of learning
  - Photos of classrooms engaged in the AASX curriculum
  - Curriculum samples
- STEAM Self-Efficacy Pre-Assessments of Educators and of Coaches. WBF Global administered pre-assessment surveys to educators and coaches from Kids Are Kids Too, Children's Educare Day Care, Friends of Children of Mississippi, Inc., and Delta Health Alliance.
- Qualitative one-on-one interviews with key project leaders and educators. The interviewees were selected in partnership with the WBF Global leadership team.
- Qualitative focus group with educators and coaches from multiple sites across the Friends of Children of Mississippi, Inc. organization.



Children learn the letter *D* and are introduced to the spelling of *dinosaur* after learning about the history of the earth and the earth's layers. Fine motor skills are engaged through coloring and tracing.

Observations & Recommendations

Observation 1

The AASX curriculum provides young children with strong foundational understandings of science, technology, engineering, arts, and math (STEAM) concepts.

The AASX curriculum delivers advanced content to pre-kindergarten-aged children in a way that is easy for them to understand. Based on the idea that toddlers are "natural scientists" and explorers, AASX caters to toddlers' process of conceptualizing the world.[8] As one landscape expert assessed, AASX is "structured in a way where the child can figure things out" and "relies on curiosity as a driver for learning." Engaging young children in active, inquiry-based activities allows them to develop their cognitive abilities and retain the information presented to them in lessons.

AASX's lessons connect advanced concepts such as the earth's layers to the ability to stack Lego blocks. The curriculum introduces foundational information to guide children in making significant connections. Once the child's interest is piqued and understanding has been established, additional information can be presented. After learning about the layers of the earth, the child can then learn a song about the layers of the earth modeled after a familiar tune. They can color letters matching the concept they are learning about — "f" for fossil and "d" for dinosaur. Educators then tell children the name for someone whose job is to study the layers of the earth (a geologist) and the child as a chance to trace the word "geologist" during their end-of-the-day recap activity.

Educators observed that the children can describe their drawings and their creations related to the curriculum. After completing their work, children can identify concepts from the lessons in their creations and draw connections back to what they have learned. During their lesson about the earth's layers, a teacher shared that the children were able to point to their stack of Legos and talk about the different layers of the earth that each Lego represented.

The AASX curriculum emphasizes scaffolding content as part of curriculum delivery. Strategic questions are used as a tool to build knowledge. Rather than asking questions which require children to recall information, AASX advises educators to ask questions which stimulate critical thinking so that children can be guided to reach conclusions on their own. These "productive" questions are intended to help children focus their attention on an observation; solve problems; compare characteristics; measure and count; make predictions; and reason.[9]

Using these questions can help children with different learning styles and abilities to develop understandings at their own pace. Children in the same classroom at different stages of cognitive development can advance in different ways. One teacher shared that she was "able to individualize" the curriculum so that it was "okay if students don't master [the concepts] at the same time as other children." The same curriculum modules can be delivered to a group of early learners who are at different stages in their cognitive development and all children could benefit in their own way.

AASX was also developed with cognitively diverse learners in mind. AASX incorporates pictures for visual learners, songs for auditory learners, and productive, hands-on opportunities for kinesthetic learners. A good deal of the AASX learning occurs through play and movement. Interviewed educators agreed that the curriculum is a good option for a diverse classroom and for children with learning disabilities because of its ability to be individualized and scaled.

AASX engages children in STEAM learning and enhances information retention.

Educators report that children are highly engaged in the curriculum and quickly catch on to accompanying concepts. Teachers and coaches heard children singing songs from the AASX curriculum days after they had been taught the new songs. One educator reported that the children "have been wanting to do STEAM every day" and that they get very "excited when they do" AASX activities.

A coach noted that the children seemed to "light up" when they were engaged with the material.

Curriculum Worksheet: After learning about the earth, early learners are asked to apply their knowledge of colors to identify continents.

Families noticed the implementation of the new curriculum. An educator shared that some parents had asked if the program was teaching in a new way because they had observed their children bringing up STEAM-related concepts at home. Parents noticed their children's expanded vocabulary and new songs that the children were singing.

"Parents asked if I [used] a new curriculum. Their knowledge base… and language they were taught… was apparent to parents."
— EDUCATOR

In contrast to more typical elements of a Pre-K curriculum such as the alphabet, numbers, and animals, one Pre-K administrator shared that her child care program had "never done anything like this." Despite this curriculum's novelty, an educator observed that "children approach the activities with ease and confidence" and that they are "able to explain, understand, listen, and follow directions" related to AASX content. The administrator noted that the children are "coming out of [the program] with more [knowledge] than they came in." Ultimately, children's knowledge development was observed to have significantly expanded after engaging with AASX.

The engagement which children demonstrate with AASX is possibly associated with the intentional inclusiveness with which the curriculum was designed. AASX deliberately welcomes children and educators alike to engage in exploration. Emmie the Scientist and El the Transportation Engineer invite children to join them as part of a community of STEAM professionals. This idea is strengthened further when children learn about jobs in STEAM fields as part of the curriculum content.

One interviewee shared that the curriculum does "not create any barriers to learning for the child — just pure, true learning experience."

The technology components integrated within the AASX curriculum have the potential to drive cognitive development, learning retention, and learning adaptability.

A digital platform is available as an additional tool for educators. Lesson guides are available on the platform and are currently comprised of presentations from which educators can teach.

Educators and coaches had a positive impression of the integration of technology in the curriculum. One focus group participant shared, "the kids' minds are left with a double impression and so are the teachers' minds." Leveraging technology to complement traditional learning adds to AASX's strength.

WBF Global is expanding its digital platform to give educators the option for children to engage with the curriculum online. Prototype features geared toward students' use is in the process of being piloted and further developed.

Technology integration is a key feature of AASX, though it was not fully utilized in all pilot sites of this project due to effects of the COVID-19 pandemic. The digital tools serve as one resource in educators' toolkits to facilitate learning and to help scaffold how educators present content to children.

Recommendation

Based on the data collected, educators report that their experience with the curriculum shows that it has the potential to yield increases in student outcomes. WBF Global should identify ways to follow students over time to identify the long-term impacts of the curriculum on their learning and interest in STEAM subjects.

Moreover, it would be beneficial for WBF Global to continue to develop its digital platform for children's active use. A digital platform presents another opportunity for children to engage in multi-sensory learning and to develop new understandings using a hands-on approach.

Observation 2

AASX offers an easy-to-understand, enjoyable introductory STEAM curriculum for early childhood educators to deliver and personalize to fit their unique teaching style.

In the past, early childhood educators' roles most often involved teaching topics which they as adults have already mastered. There has been little content that early childhood educators have had to learn in teaching pre-kindergarten-aged children. Introducing STEAM concepts disrupts the comfortable, repeatable nature of basic Pre-K curriculum, even for a seasoned early childhood educator. For example, each lesson highlights different careers related to the content being taught. This requires educators to explain and apply terms and concepts outside of anticipated early education vernacular, such as botanist and paleontologist.

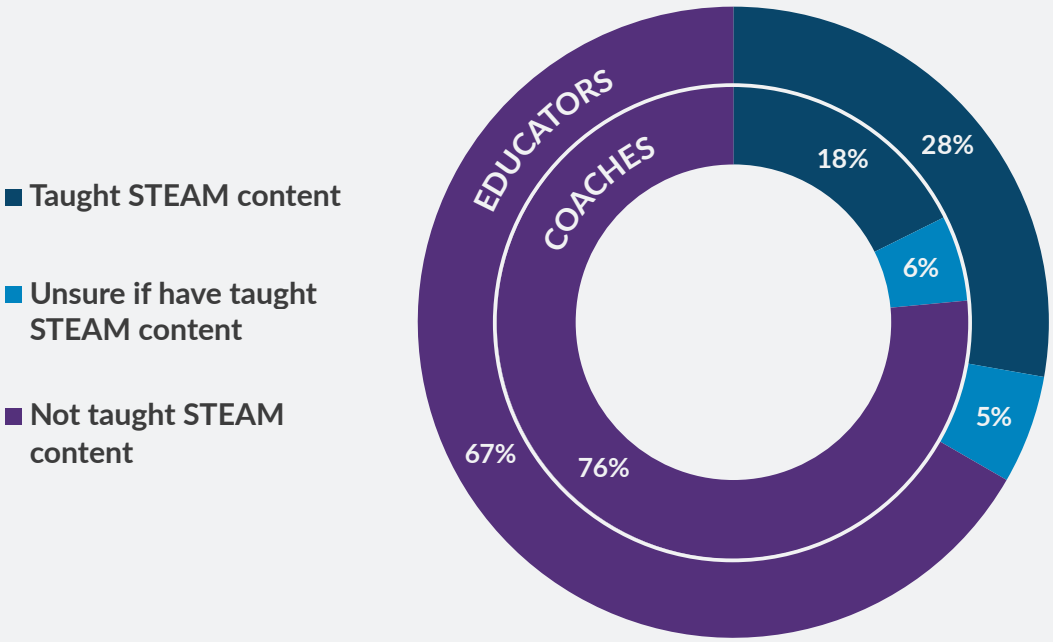
Some educators' initial discomfort translated to anxiety or resistance at the prospect of delivering STEAM curriculum. During interviews, other educators agreed that they had not meaningfully engaged in some concepts included in the curriculum since they themselves were in school.

> One educator shared, "I was nervous at first. I had to learn with them. We were both learning at the same time."

Preschoolers trace the words *scientist*, *rock*, *fossil*, *classify*, and *paleontologist* after learning about the layers of the earth

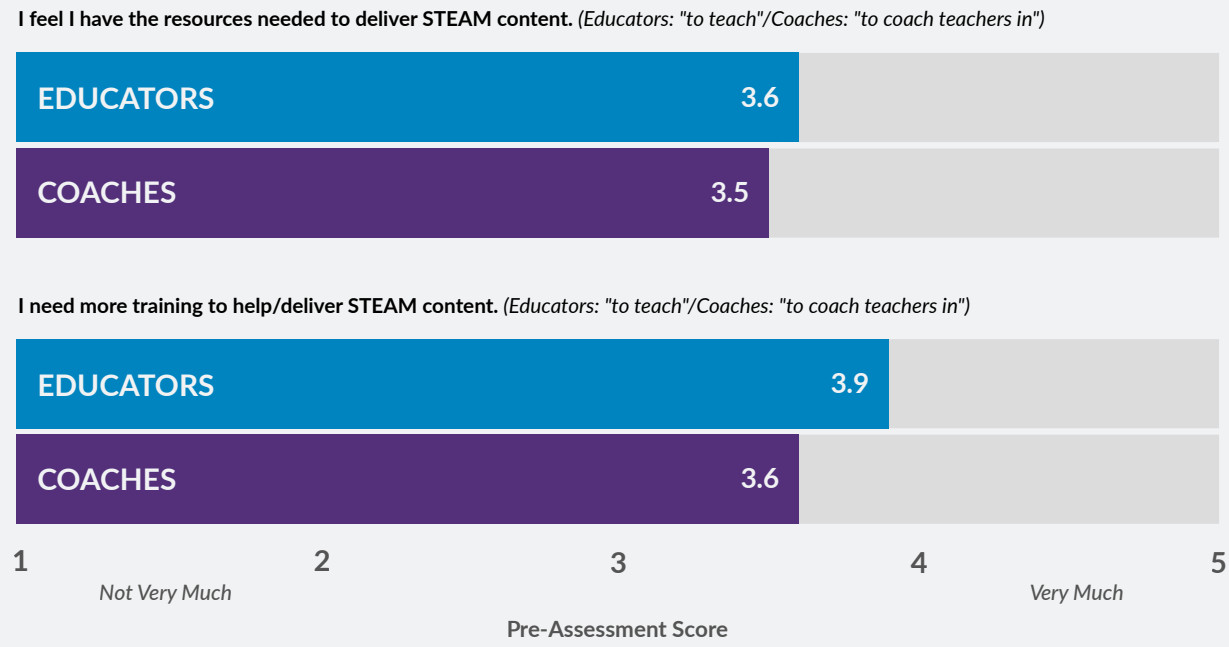
To establish a baseline for coaches' and educators' experience with and feelings toward STEAM curriculum, WBF Global developed standardized pre-assessment surveys. These surveys were distributed to educators and coaches implementing AASX at Kids Are Kids Too, Children's Educare Day Care, Friends of Children of Mississippi, Inc., and Delta Health Alliance. Respondents were comprised of 18 educators and 17 coaches. Among those surveyed, **82% of coaches and 72% of educators responded that they either had not taught or were unsure if they taught STEAM content prior to working with the AASX curriculum**.

FIGURE 2 Experience Delivering STEAM Content Among Educators (n=18) and Coaches (n=17) Administering the AASX Curriculum Before Engaging in AASX



Initially, educators reported that they felt underprepared for delivering STEAM content. Coaches and educators who had delivered STEAM content in the past rated themselves as only somewhat comfortable teaching STEAM content. Coaches and educators collectively agreed that they needed more training to deliver STEAM content. In fact, the most common response received from surveyed educators was that they "very much" needed more training to teach STEAM content. This supports the observations of a landscape expert surveyed, who shared that she has seen few early childhood educators command strong confidence or knowledge in science.

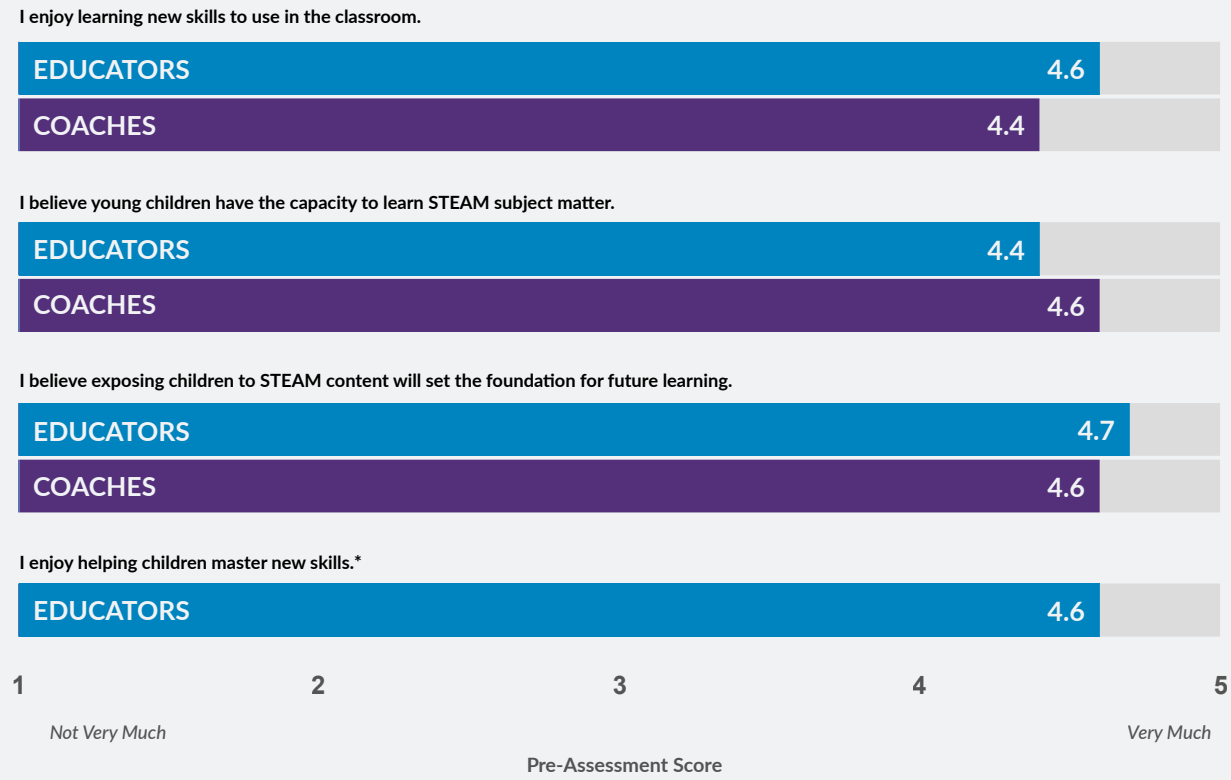
FIGURE 3 Piloting Educators' and Coaches' Self-Efficacy in Delivering STEAM Content Before Engaging in AASX



Although educators and coaches' pre-assessment demonstrated opportunity to grow in confidence as well as access to resources and training, both groups expressed a strong desire to learn and develop. The group of educators and coaches surveyed believed that STEAM curriculum would meaningfully impact children's learning trajectory. Moreover, they very much enjoyed learning new skills to use in the classroom and helping children to master new skills. This suggests that the surveyed educators and coaches felt willing to deliver a new STEAM curriculum and believed in the content's importance for young children.

FIGURE 4 Indicators of Piloting Educators and Coaches' Readiness to Engage in New STEAM Curriculum Before Engaging with AASX*

* Coaches were not surveyed on this question.



Educators and coaches consistently shared feedback that the AASX curriculum felt comfortable to implement. Although they were intimidated by the idea of presenting STEAM content at first, all interviewed educators reported warming up to STEAM through AASX. Educators reported that the curriculum materials helped early childhood educators to develop a stronger understanding of the content they were delivering.

Educators and coaches alike understood the importance of teaching STEAM content in Pre-K classrooms.

Focus group participants engaged in a lively dialogue about the importance of introducing STEAM at a young age. Another participant agreed: "the sooner you introduce [STEAM], the quicker [the children] catch on." Educators and coaches agreed that delivering STEAM content to early learners can make an important impact, not only for primary school readiness, but also for future career development.

> "The world is changing before our eyes," one focus group participant shared, and "some type of science is implicated in… varying careers… STEAM curriculum will help support that. The earlier [STEAM is implemented], the greater the [children's] chances are for success."

The focus group participants also agreed that the curriculum's integrated nature benefitted both children and educators. One coach shared that "having different areas of learning brought under one umbrella… rather than teaching them separately… helps [children] in… thinking critically." Children can more easily grasp foundations of science, math, and technology when infusing those topics with songs, drawings, the alphabet, colors, and other subjects and activities in which toddlers are already naturally engaged.

A coach also noted that the curriculum's holistic quality makes delivering STEAM material somewhat easier for educators. If an educator enters with a mindset that they do not enjoy teaching science, they will find that there are many other elements to the curriculum and that they are not strictly delivering a science-based lesson plan. Through the process, the educator could find enjoyment in delivering literacy-based elements of the curriculum and perhaps even develop an unanticipated liking toward science as they progress through the modules.

Interviews and focus groups indicate that AASX engages educators in their process of delivering the curriculum. Preconceived notions, anxieties, or resistance toward STEAM seem to dissolve over time as educators begin teaching the lesson plans. One coach shared that "every time I get a chance to talk with [the implementing educators] about working with the curriculum, I can hear and see [excitement]. Excitement exudes to the children. The children are getting all the benefits." Although this evaluation as well as the existing body of research documents challenges in early childhood educators' delivery of STEAM content, AASX's implementing educators engaged so deeply in delivering content to their students that they radiated enthusiasm. This translated to the children experiencing more interest and excitement as well.

In these ways, both children and educators benefit from the curriculum's deliberate integration of subject matters and learning processes.

AASX serves as a valuable professional development tool for early childhood educators because it habituates them to the process of continual learning and preparing new content.

One of the barriers to preschoolers receiving STEAM content could be early childhood educators' apprehension toward teaching content with which they are not familiar. The broadly accepted yet unspoken narrative that all early childhood curriculum content should be intuitive to adults must be challenged to improve school readiness among early learners. One coach noted that the AASX curriculum "did open [educators] up to understanding that you don't have to know everything to be a teacher. Part of teaching is preparing." AASX is a leader in confronting this narrative and its ease-of-use positions it to be comfortably used as a development resource for educators.

Moreover, AASX curriculum materials are intuitive and help early childhood educators to develop a stronger understanding of the content. AASX presents STEAM content knowledge within the curriculum so that the content knowledge barrier is broken down for educators. In turn, this boosts educators' confidence in delivering the curriculum.

Educators agreed that the materials they were given as part of the AASX curriculum significantly helped them to develop their own STEAM lesson plans. Yet, interviews with educators, coaches, and administrators show that over time, educators become so familiar with the material that they start to make it their own. One interviewee observed, "Once teachers feel confident teaching the materials, they innovate, and we see that happening." The educator who shared she was learning with the students went on to say, "Once I got into it, I can make it fun, do it with them. Make it my own." This personalization demonstrates that educators have integrated the content concepts so strongly that they can translate the teachings to deliver lessons in their own way.

When AASX is used as a professional development tool, educators feel increasingly confident and empowered to teach STEAM content. When more early childhood educators deliver STEAM curriculum, the talent pool for STEAM education in early childhood education is increased. This change in educator behavior has the potential to positively affect the cognitive development and learning trajectories of many children beyond those who are currently engaging with the AASX curriculum.

Recommendation

Continue to empower early childhood educators with use of AASX to strengthen their confidence and capacity to deliver STEAM education.

As WBF Global scales AASX, engage educators and coaches to serve as ambassadors to share their experience and successes.

Observation 3

AASX is an innovative, replicable, and scalable model that offers a solution to early learning organizations seeking ways to strengthen their approach to STEAM content delivery.

AASX is easy to set up and adopt. Because the curriculum contains all the content and materials an educator needs to deliver a lesson, there is little preparation needed on educators' behalf. Each module includes instructions for educators on any necessary preparation. Further, procedures are outlined so that educators can guide children in how to solve the learning activity. Each lesson contains questions of the day, which adds another tool to educators' toolkit in delivering content.

Curriculum materials are designed to integrate into educators' existing workload and lesson schedule. AASX was created for use as an efficiency for educators rather than as an addition to what they are already doing. One educator initially expressed resistance at adopting a new curriculum and thought that AASX might be a substantial addition to her existing work. After teaching the second module, a coach observed that "I saw [that educator's] attitude change and the excitement grow to a point [where] she sent me a picture. She was so excited, liked the curriculum so much, [she] made a bulletin board.... You can see the excitement has affected her and the children." Through this anecdote, we can see how initial resistance in investing additional time can transform into a willingness to dedicate time after engaging with the curriculum and witnessing children's engagement.

Educators described implementation of AASX as intuitive. One educator compared AASX to Apple products in that just as she believes it is easy to pick up an Apple device and know how to work it, an educator could pick up the curriculum, read a module, and understand what they needed to do to deliver the content to their students.

Further, AASX offers a path to bridge school readiness from early childhood programs to public schools in Mississippi. Interviewees reported frustration with the lack of synchronicity in curriculum planning between Head Start/Early Head Start programs and the public school system in Mississippi. A desire was expressed for the public school and prekindergarten systems to coordinate to discuss what content was being delivered to students. This would benefit Pre-K classrooms in that early childhood educators would more specifically understand how to prepare children for elementary school and could bridge the gap more smoothly. One interviewee assessed that AASX "align[s] with the framework for Mississippi early learning standards," and sees AASX "as a vehicle to help lead children to a strong foundation in all domains of learning."

AASX is responsive to local needs of teachers and geographies. While technology is a core component of the curriculum, AASX was developed so the curriculum could be delivered with or without the technology integration. This makes AASX accessible for all learners regardless of their access to internet connection and computers or mobile devices.

Recommendations

Vary and expand AASX to teach different subject matters and expand to different grade levels.

Educators, administrators, and coaches wanted to use more curriculums like AASX and wanted to see the AASX model presented for other concepts. Subjects such as social studies could be delivered in the same way that STEAM is currently delivered. Moreover, the curriculum's level of difficulty could be elevated so that it can become appropriate for higher grade levels. Interviewees suggested that the curriculum be expanded up through the eighth grade by integrating more advanced concepts in adding laboratory components.

Invite early childhood educators to statewide curriculum planning for the public school system.

Aligning early childhood curriculum with the public school curriculum, especially in STEAM, could have a positive impact on children's learning outcomes. AASX could be used to strengthen school readiness among Mississippi preschoolers.

Leverage the success of the current digital platform targeted toward educators and expand it for children's use.

The digital platform should complement, not replace, classroom learning which does not involve technology so that all early learners, regardless of their socioeconomic status, geographic location, or access to Internet or technological devices, have equal opportunity to build STEAM knowledge through AASX.

Ensure that AASX can be seamlessly delivered with and without internet connection.

Technology is a key component of the AASX curriculum. In rural areas, few schools have high-quality internet connectivity and many homes do not have Wi-Fi service. These factors could serve as a barrier to the expansion of not only the AASX curriculum, but any curriculum that relies upon technology to deliver content and engage students in learning. Computer-based content delivery must complement the curriculum and reinforce existing concepts so that AASX can continue to be inclusive for all early learners.

Preschool-aged children who engaged with AASX wear AASX-branded laboratory coats, just like Emmie the Scientist.

Conclusion

The All Aboard the STEAM XPRESS curriculum poses a unique solution to addressing the gap that currently exists in STEAM learning. Most pre-kindergarten learning programs do not teach STEAM. AASX places science, technology, engineering, and math within the bounds of conceptualization for preschool-aged children. This early introduction to STEAM effectively prepares children to engage in more advanced STEAM concepts once taught in later grade levels. Further, the approach taken to delivering content which relies on building critical thinking skills and scaffolding knowledge could be associated with stronger school readiness outcomes in later childhood.

By leading children to problem-solve and grapple with hands-on activities, AASX not only bridges the STEAM gap in early learning, but also invites children to see themselves as active participants in STEAM. This has the potential to expand the career paths that children see themselves entering, which could diversify and strengthen the future STEAM workforce.

Educators, coaches, administrators, and landscape experts alike agree that the curriculum effectively engages early learners. Children come out of AASX with an expanded breadth of knowledge far beyond what they otherwise would have obtained in a preschool classroom, but also with advanced problem-solving and critical thinking skills.

The impact which AASX has upon educators must be emphasized as well. Before using AASX, many surveyed early childhood educators reported a lack of tools to deliver STEAM content as well as suboptimal self-confidence in their ability to teach STEAM content. As educators began engaging with the curriculum, they were able to quickly understand concepts with which they were previously unfamiliar. Over time, their understanding grew to a level in which they were able to innovate their own lessons from the existing material. Such an application demonstrates a high level of comprehension. This finding suggests that the AASX curriculum style could serve as a tool for educators to deliver complex and unfamiliar concepts beyond STEAM in preschool and kindergarten classrooms. AASX could be replicated and scaled across different topics and grade levels to advance the content rigor being presented in schools in Mississippi and beyond.

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About Luminary Evaluation Group

Luminary Evaluation Group is a program evaluation firm that helps nonprofits and funders identify what is working, what is not working, and what options exist to enhance programming. At the core of our collaborative process is deep contextual exploration, anchored by qualitative data collection and analysis. We listen, observe, and build reciprocal relationships with our clients, and facilitate sharing and exploration between stakeholders. Our deep contextual knowledge of nonprofit programs, challenges, and goals allows us to work with stakeholders to identify useful questions for the base of the evaluation protocol, and to understand the issues and contexts of a given evaluation project. This enables us to develop an appropriate evaluation plan to reflect the reality of a program, capture existing knowledge, and produce essential new insights. Our clients report being able to clearly see actionable next steps from evaluation findings.

SERVICES

- **Program Evaluation**
  We help nonprofits assess their impact and make data-driven decisions based on findings and recommendations.
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  Organizations often conduct data collection and assessment with their own staff. We help them build evaluation plans and ongoing practices that they can implement.
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Alison has spent her career working at the intersection of nonprofit research, senior level advisement, and strategy. Alison is the Managing Director of Luminary Evaluation Group. Luminary's mission is to improve the lives of children and families by conducting high-quality, participatory research for funders and nonprofit organizations of every size, capacity, and budget who are interested in understanding, articulating, and growing their impact. In this role, Alison brings her particular expertise in participatory evaluation and human centered design, instrument development, data collection, and quantitative and qualitative data analysis. As an evaluator, Alison helps clients communicate research effectively to key stakeholders and other broad audiences. Specifically, she supports organization leaders as they work to use data effectively, incorporate evidence-based practices into programs and policies, assess effectiveness, and improve outcomes. Alison is a graduate of Williams College and holds a Master's in Elementary Education from Merrimack College.

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