GEAR UP Southern West Virginia

Algebra 1 Preliminary Focus Groups

GEAR UP SOUTHERN WV · CONCORD · NEW RIVER CTC ·

Vela Institute
Illuminating Education

About Vela Institute

Vela Institute is a nonprofit organization dedicated to increasing access to evaluation, analytics, and data tracking to education partners to improve student and community outcomes. Established in 2017, Vela Institute accomplishes its mission through applied research, data analytics, professional development, and the use of evidence-based practices.

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Executive Summary

Completing and passing Algebra I is critical to postsecondary preparation. Students who take Algebra I by the end of 9th grade are more likely to graduate high school and enroll in postsecondary education. GEAR UP has a goal to increase the percentage of students passing Algebra I by the end of 9th grade to set them up for any postsecondary pathways students may want to pursue. The Vela Institute partnered with GEAR UP Southern West Virginia to conduct a case study on Algebra I learning and supports. As part of this effort, student focus groups were conducted to understand the challenges students face and potential solutions for successfully passing Algebra I.

Participants and Procedures:

- **Student Perceptions of Algebra I:** Students had mixed feelings about Algebra I, with some finding it challenging and others enjoying it. Common difficulties included understanding the mix of letters and numbers and transitioning between different sections of the subject.
- **Motivation and Engagement:** Students were motivated to do well in Algebra I by minimum grade requirements for sports/extracurricular involvement and postsecondary plans. However, distractions in class and a perceived lack of relevance to future plans were barriers to engagement.
- **Instructional Methods:** Instructional style significantly impacted students' experiences. Students preferred a mix of individual and group work, with a preference for paper-based learning over online learning.
- **Resources and Tools:** Students found textbooks and working problems as a class helpful but criticized overuse of online learning platforms and preferred McGraw Hill over IXL. There was a general reluctance to seek tutoring due to embarrassment or lack of time.
- **Challenges and Barriers:** Classroom environment, accessibility of online resources, and learning loss due to the COVID-19 pandemic were significant challenges. Math anxiety also inhibited students from seeking support.
- **Support and Feedback:** Students appreciated teacher support but desired more time in class to work through problems at a slower pace, as well as explicit feedback on their work.

Recommendations Include:

1. Connect Algebra I with real-world applications and students' interests.
2. Experiment with various instructional formats and offer more interactive examples.
3. Address learning loss by providing additional support in areas that students self-report.
4. Destigmatize tutoring by framing it as a tool for success and using GEAR-UP-funded Tutor.com in class.
5. Positively reinforcement student effort and more specific feedback to students on how to improve.

Introduction

GEAR UP Southern West Virginia (GUSWV)

Concord University was awarded a GEAR UP grant to serve several counties (Mercer, Monroe, Raleigh, Summers, and Wyoming) in Southern West Virginia by the U.S. Department of Education. This grant supports efforts to increase the number of low-income students that obtain a secondary school diploma and prepare for, enroll, and succeed in postsecondary education through a range of services to students, parents, and educators.

The Challenge: Project Overview and Purpose

Completing and passing Algebra I is critical to postsecondary preparation. Students who take Algebra I by the end of 9th grade are more likely to graduate high school and enroll in postsecondary education.[1] GEAR UP has a goal to increase the percentage of students passing Algebra I by the end of 9th grade to set them up for any postsecondary pathways students may want to pursue. The Vela Institute (Vela), an external evaluator, partnered with GUSWV to conduct a case study on Algebra I in order to understand challenges and potential solutions for high school students successfully passing Algebra I. Part of this case study included gathering qualitative data throughout the year to provide context to the state of Algebra I performance in Southern West Virginia.

Understanding Perceptions: Focus Group Evaluation

To evaluate the perception of stakeholders in Algebra I, Vela conducted focus groups to get first-hand accounts of experiences in the Algebra I classroom and identify potential resources that would help students succeed. Focus groups consisted of thirty-two high school students across four high schools in Mercer County in December 2024. Students with a variety of performance levels were nominated by their teachers to give input on their experience in Algebra I and ways that they and their classmates could be better supported. Teachers were unable to participate in educator focus groups due to inclement weather but will be surveyed in the Spring 2025 semester to gather their perceptions of successes and challenges in the classroom.

Analysis:

The data provided insight into the experiences of high school students in Algebra I and their successes and challenges. See Appendix 1 for the focus group protocol. Responses were coded, and themes were identified from the recording transcripts. Key findings emerged from patterns and themes of responses, as outlined below. These themes highlight the diverse experiences and perspectives of students in their Algebra I classes, as well as suggested areas where improvements could be made to enhance their learning experience.

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[1]Data Point. (2019). Algebra I Coursetaking and Postsecondary Enrollment [NCES 2019-154]. U.S. Department of Education. https://nces.ed.gov/pubs2019/2019154.pdf

Findings

Student Perceptions of Algebra 1

Students expressed a range of opinions about Algebra I, from finding it challenging and disliking the use of letters in equations to feeling indifferent or even enjoying it. Students generally find Algebra I more tolerable than other math subjects. Still some students find the course content easy to understand, while others struggle with certain aspects like equations and math vocabulary.

Many students expressed difficulties with algebra, particularly with understanding the mix of letters and numbers, and the transition between different sections of the subject. Students felt as if they barely mastered one concept before learning an entirely new concept that did not clearly build on or connect to their prior unit.

FOCUS GROUP QUOTES

"Being letters and numbers mixing together... it'll be like hard for one section and then the next session is like, it's fine. It's easy. And then the section after that, it's like, oh, what is this?" - Student

Motivation and Engagement

When students were asked about what motivates them to do well, they indicated that the consequences of class performance were motivating. Most students pointed to external motivators, such as sports and extracurricular involvement minimum grade requirements, as the primary reason to keep all their grades acceptable, including Algebra I. Other students expressed a lack of motivation due to not seeing the relevance of algebra in their future plans or its usefulness in everyday life.

The most engaged students cited internal motivation for pursuing their postsecondary plans as motivation to do well in Algebra I and other courses. For example, one student wants to work in the medical field and needs to do well in math to get into college. Another student wants to play football professionally and was intrigued by the amount of math that goes into sports playbook plans, sparking his interest in creating a foundational understanding of math.

FOCUS GROUP QUOTES

"I want to be in the NFL and I know I'll use math in the NFL because I've talked to NFL players. I've read some of their playbooks and they used math like in the setting of playing football, so I know I'll use it sometime later in life." - Student

Students reported that distractions in class, such as other students being loud or disruptive, prevented them from engaging and performing at the expected level. Students in classes with fewer distractions and more structured group work cited more interest, success, and self-efficacy than students in classes with many disruptions or no peer interaction. Students emphatically suggested utilizing more games and reported that activities help with their engagement and understanding.

FOCUS GROUP QUOTES

"I don't like projects because they are graded but activities are really fun and help me learn [with less pressure]. Recently we have just been doing a little bit of notes and the rest of the time is McGraw Hill, then taking a test, then McGraw Hill, then taking a test..." - Student

Many students cited boredom and disengagement when learning formats remained the same day after day. Students particularly do not enjoy several online learning platforms utilized and find other formats to be more helpful; for example, students prefer McGraw Hill over IXL but find in-person, on-paper problems more effective (further detail provided in the Resources and Tools section below).

Instructional Methods

The instructional style of the Algebra I math class significantly impacts students' experiences. Students mentioned that it is helpful when the teacher explains concepts in a detailed, slow, methodical manner and provides further one-on-one support when needed. Some students wished that teachers would slow down a little bit, and utilizing more time in class for whole-class or group work as opposed to independent practice might aid in preventing so many students from needing one-on-one support in class.

FOCUS GROUP QUOTES

"[My teacher] does a good job breaking down the problem but may go too fast for some other students." - Student

There is a mix of preferences for instructional methods, with some students preferring individual work and others liking group work. Most students wish to work in groups of their own choosing or as an entire class. They suggest utilizing a variety of instructional styles to cater to different learning styles, such as using partner or group work one day and independent work another day.

FOCUS GROUP QUOTES

"I feel like it's better to have like a partner of your choosing that you know, because [otherwise] you feel uncomfortable, especially if it's awkward, like if I didn't know somebody in here. I find it helpful to [work with] someone who knows what they're doing." - Student

FOCUS GROUP QUOTES

"I like [learning from] the teacher and having other kids pitch in. Sometimes some kids don't understand the teacher but others who are learning it ten times faster can pitch in and be helpful in everyone understanding." - Student

The majority of students in the focus groups prefer a mix of online and on-paper work, not just online. Many wish to have more on-paper work and whiteboard problem-solving as a class. There is a preference for paper-based learning over online learning among students as they find it easier to comprehend and prefer to show their work on paper.

FOCUS GROUP QUOTES

"The online learning makes it harder to learn. I think it's just you just by yourself and you don't have any help. I dread doing it and it's not helpful." - Student

Some students found hands-on examples and step-by-step walkthroughs helpful, while others struggled with the vocabulary and preferred more interactive or practical approaches

FOCUS GROUP QUOTES

"I feel like I kind of catch on easier, maybe, just like actually be shown how you do. I can't, like look at a book and be like, directions to our back could have somebody, like, telling me, hey, do this, this. So walking through some examples in my stuff is better than just reading it." - Student

There were varied opinions on the effectiveness of instructional methods. Some students appreciated their teacher's approach, while others felt that they did not understand the content as presented. The lack of detailed explanations and insufficient notetaking related to practice problems were common concerns in some classes. Other classes cited excessive notetaking and not enough practice problems worked out together. The majority of students wished for more in-depth examples to be worked out by the teacher and as a class on boards.

FOCUS GROUP QUOTES

"I think more examples [in class] would be good." - Student

Several students have anxiety over going up to the board when called on, but would be interested in seeing volunteer students work a problem and explain it. The importance of a supportive classroom environment was highlighted. Students appreciated teachers who were approachable and provided clear explanations.

Resources and Tools

Students mentioned various resources they found helpful, including understanding how to use calculators, textbooks, working problems as a class with the teacher, and online learning platforms like McGraw Hill. However, there were also criticisms about the limitations of these resources, such as repetitive problems and lack of detailed explanations. The majority of students dislike IXL and prefer McGraw Hill when utilizing digital learning. They generally found IXL to be both repetitive and unhelpful, as well as time-consuming. Several students turn to the PhotoMath app to check their work and help break down problems further in a way that makes more sense than other platforms. While PhotoMath could just give them the answer, the application was cited as making more sense for being able to solve the same type of problem on their own in the future. Most students report not using whiteboards to work out problems.

FOCUS GROUP QUOTES

"PhotoMath breaks down each step of solving the problem more detailed [than my teacher]. The textbook only gives answers, not how to solve the problem." - Student

"It's not so much that PhotoMath gives me the answer, it's that it breaks it down more and I can actually look at it and understand." - Student

"I use PhotoMath to break [the problem] down and check my work." - Student

There was a general reluctance to seek tutoring due to embarrassment or lack of time. Some students felt that they did not need tutoring, while others mentioned that they would benefit from additional support but were hesitant to ask for it. Many students expressed distrust and discomfort with online tutoring sessions, such as through GEAR-UP-funded Tutor.com. Barriers to online tutoring at home included lack of internet access, family responsibilities (such as chores), and parents' expectations of how students should spend their time.

FOCUS GROUP QUOTES

"I don't know [the tutor] and I'm a very shy person. I prefer to ask someone in person." - Student

"If someone knows you do tutoring, then they're gonna be like, 'oh, you're dumb'." - Student

Regarding the use of Tutor.com, some students reported that it was being used in class as punishment for low performance or lack of engagement. The few students who had used Tutor.com found it to be helpful after getting over the initial discomfort of working with a stranger, regardless of whether the format was virtual face-to-face or messaging.

More broadly, several students were unaware of both in-person and online tutoring resources available to them, indicating an interest in one-on-one and in-person tutoring before or after school. Students are interested in utilizing tutoring when needed outside of the stigma associated with it, as they perceive tutoring as only necessary if they "are not smart."

Additional Challenges and Barriers

The classroom environment was described by some students as noisy and sometimes chaotic, with distractions and a lack of classroom control affecting the learning experience. Some students felt that their teachers did not enforce strict rules around behavior in the classroom, which hindered their ability to focus.

FOCUS GROUP QUOTES

"When the whole room is quiet, I can focus more. I feel like whenever everyone was loud, I can't." - Student

Furthermore, students were concerned about the accessibility of online textbooks, digital learning, and Tutor.com for students without internet access and/or difficult home lives. Students suggested focusing on support during the school day or at least in person before or after school. Some students see the absence of parental involvement at home and lack of internet access as barriers to succeeding in Algebra I, greatly impacting engagement, motivation, and performance.

Students also reported struggling with some concepts. They find graphing and the addition of letters into math equations challenging, particularly since multiplication and division foundations are taught during 4th and 5th grade when these students experienced learning loss due to the COVID-19 pandemic. Students indicated that lacking some of these basic foundations in math inhibits learning concepts that utilize and build on these fundamentals.

Math anxiety also inhibits students from seeking support and further feedback. Many students do not feel comfortable going up to the board to work through problems, asking for help in front of others, or admitting they go to tutoring. While many students feel comfortable asking their teacher for help, other students are fearful of what their teacher may think of them or say when asking for help or not understanding some concepts.

Support and Feedback

Students appreciate the support from their teacher but feel that more time is needed to work through problems and break down the individual steps. They also value feedback on their work, which helps them understand their mistakes.

FOCUS GROUP QUOTES

"When we get an assignment back, [it would be helpful for my teacher] to write down what we didn't do or circle something we did wrong." - Student

Students reported that their learning loss during school closures due to the COVID-19 pandemic impacts their ability in math, as they feel behind on the skills learned during the grade they were in during that time, such as advanced multiplication and division, including fractions. These are areas to provide additional help with as foundations to Algebra I concepts.

FOCUS GROUP QUOTES

"I missed fourth grade and fifth grade [math due to the pandemic]. It's an important time with advanced division and multiplication. I don't really know how to do division or anything like that." - Student

Students who do not receive explicit feedback on what they did wrong or where to improve desire such feedback. Students who feel they receive regular feedback on how to improve have more satisfaction with their experience in Algebra I, as well as respect for their teacher even if they struggle with math.

FOCUS GROUP QUOTES

"[I like that] you get a note—like 'good job, keep up the good work'—or if you didn't get such a good grade, [my teacher] explains what was wrong and how to fix it." - Student

Student Suggestions for Instruction Improvements

Students suggested several ways to improve the Algebra I class, such as providing more detailed explanations, using different instructional methods, and incorporating more interactive and engaging activities.

Some students find the pace of the class too fast and suggest slowing down to ensure everyone can keep up. By slowing down, students think there will be more understanding and less demand for one-on-one help in class, aiding in the capacity of their teachers. They also mention the need for more one-on-one tutoring outside of school and better management of student behavior in large class sizes.

There were also suggestions for making the class more engaging through activities and games which they have done a few times but would like more of. Activities and games can develop more comfort and less anxiety in the math classroom while making real-world connections, enhancing understanding and motivation.

One thing students would tell their teachers

When students were asked about what the one thing they would tell their teacher, they answered:

FOCUS GROUP QUOTES

"Thank you!"

"Everybody learns in a different way and it's hard for teachers to help each one. I give [kudos] to teachers for doing what they do and helping because they can't just put their attention on one kid all the time."

"Just spend a little bit more time on problems."

"Slow down when explaining."

"Maybe don't assign so much out of the book, like book problems. Maybe make your own problems, because if you go in the book, you can go to the back of the book and look at the answers. It doesn't explain how to solve it, it just like shows you the answer."

"I think more hands-on work and more examples would really help me."

"I struggle with math and my teacher really helped me more than any in the past. My teacher worked with me to help make math make more sense."

"The way [my teacher] has been teaching [with a variety of detailed examples] is very helpful, and [my teacher] takes the time to make sure we actually understand what we're doing."

Recommendations

Based on student feedback, the following recommendations are suggested to engage and support learners:

1. **Talk to students and classes about postsecondary education**. Students who plan to pursue some level of postsecondary education are more motivated to achieve good grades. Thus, connecting class content to the benefits of postsecondary education could help improve student motivation and performance.

2. **Connect Algebra I with real-world applications with which students can identify**. Provide examples of when students themselves may use math concepts learned in Algebra I in their current lives. Surveying students to understand hobby and career interests that could guide examples of connections and improve engagement.

3. **Offer hands-on and interactive learning** by incorporating more hands-on examples, step-by-step walk-throughs, and interactive activities to help students better understand Algebra I concepts.

4. **Experiment with various learning formats**, including activities, gamification strategies, and class-wide problem-solving. Utilize a variety of instructional methods to reach all types of students and increase engagement and understanding. Introducing these activities will also meet students' desire for more games, activities, and other learning experiences so that each day is not the same.

5. **Address learning loss and provide additional supports** for students who experienced learning loss during the COVID-19 pandemic, particularly in foundational math skills.

6. **Encourage peer collaboration by promoting group work**, allowing students to choose their partners or work as an entire class. This can create a more comfortable and supportive learning environment while increasing teacher capacity to address questions.

7. **Communicate available resources to students,** such as tutoring options, often and in various formats. When providing options, utilize language that is not stigmatizing. For example, frame it as a tool for all students to enhance their understanding instead of punishment or just for those struggling.

8. **Destigmatize tutoring.** Introduce and utilize GEAR-UP-funded Tutor.com in class with all students to familiarize them with the platform and reduce the stigma associated with seeking help. Communicate the availability of tutoring options frequently and in various formats.

9. **Provide positive reinforcement.** Encourage students to do their best, foster a growth-mindset, and reward them for their efforts, as teachers' positive reinforcement and belief in students' abilities can boost their motivation and success.

10. **Increase feedback mechanisms** to ensure that students receive regular and constructive feedback on their work. This can help them understand their mistakes and improve their performance. This could include a guide breaking down how to solve test questions or working through commonly missed questions on the board after a quiz/test, instead of just providing answers.

Appendix 1 - GUSWV Algebra I Student Focus Group Protocol December 2024

Background

1. What Works Clearinghouse. (2019). Teaching strategies for improving algebra knowledge in middle and high school students. Institute of Education Sciences, U.S. Department of Education. Retrieved from https://ies.ed.gov/ncee/wwc/PracticeGuide/20

2. Liljedahl, P. (2020). Building thinking classrooms in mathematics, grades K-12: 14 teaching practices for enhancing learning. Corwin. https://wegrowteachers.com/building-thinking-classrooms-evidence-cognitive-science/

3. Rosenshine, B. (2012). Principles of instruction: Research-based strategies that all teachers should know. American Educator, 36(1), 12-19. Retrieved from https://www.aft.org/sites/default/files/periodicals/Rosenshine.pdf

Interviewer

1. Thank everyone for participation. Introduce yourself and explain your role in Vela Institute, "Thank you for your participation in this focus group. My name is _____. I work with Vela Institute and we have been asked to talk to you about your experience in Algebra I. Today I hope to hear from you all about what is going well, what support you need, and any other feedback that would be helpful to improve the class for you and future students.

2. Confidentiality: "Participation in this focus group is voluntary and you may leave at any time. Our Confidentiality policy at Vela states that everything you share today is confidential. If anything you say here is shared in a report, it will be anonymous- meaning we will not include the school or your name."

3. I will be recording this so I can go back and listen to themes, common responses, and highlights.

4. Does everyone understand the purpose of this Focus Group? Do you all give consent? Do you all give consent to be recorded?

Questions

1. General Experience:
   a. How do you feel about learning Algebra I so far?
   b. What aspects of Algebra I do you like or dislike the most?
2. Understanding and Comprehension:
   a. Which topics in Algebra I do you find the easiest to understand?
   b. Are there any specific concepts or topics in Algebra I that you find particularly challenging?
3. Classroom Environment:
   a. How do you feel about the way Algebra I is taught in your class?
   b. Do you feel comfortable asking questions in class when you don't understand something?
4. Resources and Materials:

a. What resources (textbooks, online tools, etc.) do you find most helpful for learning Algebra I?
b. Are there any additional resources or materials you think would help you understand Algebra I better?

5. Homework and Practice:
   a. How do you feel about the amount and difficulty of homework in Algebra I?
   b. Do you think the homework assignments help you understand the material better?
6. Support and Assistance:
   a. What kind of support do you receive from your teacher when you struggle with Algebra I?
   b. Are there any other forms of support (tutoring, study groups, etc.) that you think would help you?
7. Assessment and Feedback:
   a. How do you feel about the tests and quizzes in Algebra I?
   b. Do you receive helpful feedback on your work that helps you improve?
8. Engagement and Motivation:
   a. What motivates you to do well in Algebra I?
   b. Are there any activities or projects in Algebra I that you find particularly engaging or interesting?
9. Growth Mindset
   a. Do you believe you have what it takes to succeed in Algebra I? Why or why not?
   b. What barriers do you need to address before you can successfully pass Algebra I?
10. Peer Interaction:
    a. How do you feel about working with classmates on Algebra I assignments or projects?
    b. Do you find individual or group work more helpful in understanding Algebra I concepts?
11. Suggestions for Improvement:
    a. What suggestions do you have for improving the Algebra I class?
    b. Is there anything specific you would like to see changed or added to help you learn Algebra I better?
12. Conclusion
    a. Is there any other feedback you would like to provide about the class, what you need, or anything else?

Added Questions

Are you using the whiteboards on the walls in the classroom?

If you could say one thing to your teacher, what would it be? What one thing would really help you?