

MathFit Business Analysis

Executive Summary:

The MathFit business aims to deliver a math application with gamification and feedback analytics to facilitate number literacy for children in grades 7 to 9, with a specific focus on underserved locations in South Africa. The application targets the Shaya Izibalo Math Institute initially and intends to expand to other underserved demographics where math literacy rates are historically low.

The market analysis highlights nine core players in the education technology (EdTech) market, including K-12 education apps, test preparation apps, MOOC portals, tech learning solutions, gamified learning apps, language learning platforms, career development apps, learning management systems, and school administration apps. MathFit operates in the K-12 space, the gamified learning app space, and the learning management system space.

The EdTech industry overview showcases the global growth of the education technology market, with increasing investments and the transformative impact of digitization on education. The market is expanding in both developed and emerging economies, including the United States, China, and Africa. Africa, in particular, presents opportunities for EdTech due to its growing mobile phone market and the need to address educational access and connectivity challenges.

Within the K-12 sector, gamification and immersive content are becoming increasingly popular, providing an engaging learning experience for students. MathFit aims to leverage gamification, feedback analytics, and personalized learning to cater to the needs of students in grades 7 to 9. The business seeks to address the needs for differentiated learning experiences, equal access to quality education, classroom management tools, collaboration, and interactive technology.

The competitive landscape analysis reveals that while there are existing players in the EdTech market, MathFit's niche focus on underserved populations and gamified math learning sets it apart. The business aims to differentiate itself by creating a personalized solution that resonates with specific demographics and offers an engaging and practice-focused math learning experience.

Scalability and expansion present challenges, particularly in terms of content creation and customization for different demographics. Strategies such as scalable content design, crowd-sourced content creation, and partnerships with educators can facilitate growth. Collaborations with schools, educational institutions, nonprofits, and government agencies are essential for expanding the application's reach and leveraging existing networks.

The stakeholders identified for MathFit include children, parents and guardians, educators and teachers, schools and educational institutions, nonprofit organizations, government agencies, donors and philanthropic organizations, corporate sponsors and partners, and research institutions. Each stakeholder group has a vested interest in improving number literacy and supporting educational growth among underserved populations.

The revenue model revolves around philanthropic donations, grant funding, corporate partnerships, sponsorships, collaborations with education institutions, crowdfunding, and licensing or partnerships with organizations. The cost model encompasses technology infrastructure and development costs, content creation and maintenance, localization and customization, partnerships and collaborations.

In conclusion, MathFit aims to address the need for math literacy among underserved populations in South Africa by providing a gamified math application with feedback analytics. The business seeks to leverage partnerships, customize content, and employ a sustainable revenue model to facilitate its growth and impact in improving number literacy among children in underserved locations.

Value Proposition: Deliver a math application with gamification and feedback analytics to facilitate number literacy for children in grade 7 to grade 9

- Target Market (To start): Shaya Izibalo Math Institute in South Africa with the goal of expanding to predominantly underserved demographics where math literacy rates are historically low

Market segment: We identified nine core players in the market to understand where our specific business solution falls:

1. **K-12 Education Apps:** Provide school students and tutor kids with high-quality videos designed primarily on the academic curriculum (Ex: BYJU'S, PlanetSpark, and Blackboard Radio)
2. **Test Preparation Apps:** Help students prepare for entrance exams like LNAT, USPC, Mensa, IELTS, Gaokao, and CFA by tracking progress, helping students gain confidence, and allowing them to prepare for the exams at their own pace and convenience. (Ex: NeoStencil, Classplus, Examify, and Top Rankers)
3. **MOOC Portals:** Distance learning courses offered online by top universities across the globe. (Ex: Coursera, Udemy)
4. **Tech Learning Solutions:** Empower students to excel in coding and programming. Ex: Coding Labs, Aeon Learning, and Edureka.
5. **Gamified Learning Apps:** Enable learners to study and test their knowledge while playing a quiz or participating in any activity. (Ex: Moose Math, Masha and the Bear, Shifu, and Vismory)
6. **Language Learning Platforms:** Help users learn a new language or practice any already known language in a highly gamified and interactive manner. Ex: Duolingo
7. **Career Development Apps:** Facilitate graduates and other professionals to understand the basics of their dream job and prepare for the same faster and more effectively
8. **Learning Management System:** Provides the facility to administer, track, report, and deliver the learning resources, along with other products like discussion boards (Ex: Canvas)
9. **School Administration Apps:** Used by teachers and school administrators highly to manage schedules, organize special events, calculate payroll, invoicing, etc. (Ex: Asana, Gibbon, Fedena, and Evernote)

Across these main segments, we plan to operate in the K-12 space, the gamified learning app space and the learning management system space, with the diagram below identifying different players in the market whom we plan to draw inspiration from:



Market research on Edtech:

Industry Overview: The global education technology market size was valued at USD 106.46 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 16.5% from 2022 to 2030. The global education market spends some \$5 trillion annually, yet until recently Ed Tech has only been a minor piece of education funding. That is shifting rapidly as digitization is beginning to transform education, both in higher education and in K–12. The market for EdTech has grown exponentially not just in the strongest economies, but also in emerging and developing ones. The U.S. is considered to be a leader in EdTech, with 60 percent of all EdTech investment going to American companies, and investment is growing steadily, with \$1.45 billion raised by U.S. Ed Tech companies in 2018 alone. In China, where families spend more than one-third of their income on their children’s education, EdTech is one of the fastest growing sectors. According to Business Insider, the market for online English-tutoring products in China is expected to reach \$8 billion in 2019. In Africa, Ed Tech products provide an opportunity to address issues of connectivity and education access. As a continent with the fastest growing mobile phone market in the world, getting content to learners is getting easier. Ed Tech funding has increased significantly in Africa, with the number of Ed Tech startups growing rapidly and investors taking notice.

(K-12 Sector Insights):

The K-12 segment led the market in 2021, accounting for over 40% share of the global revenue. The high share can be attributed to the growing trend of game-based learning in the K-12 sector. The majority of the teachers in the K-12 sector support gamification initiatives to develop the students’ math learning skills with the integration of practical, project-based work in schools. Additionally, incorporating technologies in this sector enables immersive content and provides experiences, such as virtual field trips and complex lab-based experiments, resulting in an engaging learning experience. For instance, in September 2021, Matific., an EdTech platform that offers learning math for K-6 students, launched a gamified environment for its students to learn math. This advanced version is personalized AI-powered for students to develop their math skills.

(Needs to fulfill in K-12 Segment):

1. Creating differentiated learning experiences to appeal to unique learning types
2. Leveling the playing field & closing the global education and resource gap
3. Classroom Management Tools to Improve Teaching Efficiency
4. EdTech that Maximizes Collaboration
5. Interactive Technology & Omni-channel e-learning that bridge the gap between technical, academic and career-oriented skills

(Trends Specific to K-12 Sector):

1. Accelerating investments in edtech
2. Rise of Smart Classrooms
3. Post Covid world encourages virtual learning & homeschooling
4. Accessible Learning

5. Gamification
6. AI Enabled Adaptive Learning

The Why of EdTech:

(The Big Question for EdTech Founders): Over the past decade, Ed Tech has increasingly become seen as a necessary innovation for solving challenges in the global education system. There is evidence that evolving demands in the labor market will require students to become more digitally literate. In parallel, leveraging technology is increasingly viewed as a promising solution to basic global learning issues that remain unsolved. Investors in the Ed Tech space span the full spectrum of funders, from philanthropic foundations to venture capitalists. These two extremes of the funding spectrum often have competing or at least divergent goals, valuing social mission on the one side and ROI on the other. Interestingly, the two sides seem to converge when investing in EdTech— valuing both financial ROI and social returns (this is also in line with the growing popularity of “blended capital”). While this is a positive sign for Ed Tech and its growth, this presents aspiring Ed Tech entrepreneurs with a funding challenge: They must present products that both have potential to scale and at market-rates and have potential or proven impact on teaching and learning

(Investor Goals & What makes good EdTech): In addition to the below graphic, we’ve identified seven main criteria for investing in specific EdTech companies: 1) People and teams, local knowledge, 2) Customer Discovery, 3) Research-based product development, 4) Sustainable Business Models, 5) Vision for Impact, 6) Measurement, evaluation & Learning and 7) Scale

Goals for Investing in Ed Tech:			
Investor goals and investment theses broadly overlapped and covered seven goals across three broad themes			
Goal 1	Increase access to education	Ensuring all children have access to a quality education— equity of access, diversity, and inclusion	Learning Outcomes
Goal 2	Improve educational outcomes	Integrating technology to help students learn more efficiently and effectively; improving outcomes in subject areas such as math and science; providing access to differentiated and/or personalized learning products—can include parents too	
Goal 3	21st century career readiness	Identifying products that bridge gaps in skills-based training, providing access to continual learning, building workforce skills, and improving future employability—includes workforce development, upskilling, computer science education, technology education, and digital literacy	
Goal 4	Lift up vulnerable populations	Entering markets where venture industry previously would not go (which also improves access for previously unreached populations)— focus on serving disadvantaged populations in terms of gender, age, and geography	
Goal 5	Support teaching	Building capacity of teachers and creating environments that support and enable differentiated learning—classroom and lesson plan management	Process Outcomes
Goal 6	Improve systems	Strengthening systems that deliver education such as fixing government processes and procurement and strengthening systems within schools by supporting operations—attendance, communications, tracking of data, etc.	
Goal 7	Improve data collection	Leveraging Ed Tech to generate better data on learning and other educational outcomes	Evaluation

(Edtech Investment Opportunities in Africa): Africa has a burgeoning market poised for growth with almost 60% of Africa's population under the age of 25 with an average literacy rate of 70%. Many see Ed Tech in Africa as an opportunity to provide access to education for millions of children currently without accessible, formal education. But while there is documented interest in Ed Tech in Africa, most of the information relayed is about the market potential. Articles cite a few companies as having reached a critical mass and mention the names of a few major VC firms investing in Africa, yet there is limited information on how decisions are being made in terms of types of companies that are receiving investment or what investors are looking for when investing in a certain company over another. That said, there are a number of articles that mention the need for local entrepreneurs, who understand the local context and barriers to execution such as a lack of connectivity or electricity, to help solve the education divide.

(Needs to satisfy for this Market)

- Dismantling the notion that a one size fits all approach can succeed for a continent as large and diverse as Africa
 - (Ex: technology developers from outside Africa have often simply translated their digital learning content to Swahili and used black icons to reflect the African App user)
 - 2,000 distinct languages spoken in Africa
- Overcoming hardware needs, connectivity costs, building baseline digital skills
- Ensuring an equal playing field
 - Research shows that women in sub-Saharan Africa are approximately 40% less likely to use the internet than men.

Why Math:

- 1) For the purposes of scale:
 - a) Ease with which we can leverage Python libraries to auto-generate content for us to ensure a steady stream of problems
 - b) Easier to adapt the platform to niche demographics based on cultural differences such as language barriers
- 2) Builds a foundation in Problem Solving & Critical Thinking Skills
- 3) Math warrants a need for repetition & practice which is where an app, especially one with gamification, can be very useful
- 4) Can better leverage learning analytics & therefore create a more curated learning experience specific to the student's needs and level
- 5) Math lends itself better to interactive visualizations & explorations (virtual manipulations/simulations)

Why Grades 7-9

- 1) Most critical years in terms of when students start to build strong foundations in number literacy (based on standards set by Shaya Izibalo Math Institute)
- 2) Content is generally able to be automated
- 3) Lack of players in this specific demographic: Most gamified math platforms are targeted towards primary school students with concepts such as counting, addition, subtraction
- 4) Students in this age range are more likely to have access to cellular devices to engage with our platform

The Innovation: Our product hinged on first creating a a full functioning app and interface through which students can 1) join the respective classes for their teachers and connect with their classmates 2)

complete each assignment as it is assigned to them 3) track their progress over time and understand what concepts they need to focus more on and 4) acquire badges, new levels and track their growth on a leaderboard through gamified features. Likewise, teachers can 1) create groups amongst their classes based on skill level, 2) designate new personalized challenges for each student and 3) track students progress to better optimize in-class lessons around student needs. Alongside the platform, we also developed an AI generative model that, when trained on a sample selection of algebra and arithmetic questions, is able to regenerate similar questions and associated answers choices for students to answer. Each question is given a difficulty rank measured by the frequency of students who answered the question incorrectly and as students progress through the questions, the questions get increasingly more challenging each time you correctly answer a question.

Competition:

Top Players:

1. Khan Academy: Mostly deals with teaching videos & content curation; not specific for math; very little analytical capabilities for creating a personalized learning journey for students; limited practice problems for students; minimal gamification
2. DreamBox: Very U.S. centric approach as it aligns itself with Common Core standards; Does apply gamification & adaptive learning; targets both math & reading; costs money; typically B2B (sold to schools & school districts)
3. Thinkster Math: Focus on SAT math & test prep; Includes heavy analytics with strengths & weaknesses; Includes human component as you can schedule sessions with live tutors; Generates personalized improvement plans; Costs money

While the edtech space overall is laden with competition, we are targeting a fairly specific niche market by appealing to traditionally underserved markets and so this is where our primary competitive edge kicks in. Of course, this too comes with a slew of risks. As mentioned above, there are many logistical barriers to entry even for a market where we have personal connections as well as prior experience with as a team. While the specific demographic we are targeting does not face the technical accessibility and connectivity issues we anticipate with other areas in Africa, this will prove a problem as we go to scale to other underserved populations. Additionally, because we aim to create a personalized solution curated to each demographic, it is likely that we will need to have strong understandings of each segment prior to entry similar to how Uber must do a market analysis prior to entering any given geographical location to ensure that they position themselves in line with cultural norms to really ensure success and adoption with the local people. This is no doubt a very time and labor intensive process, but one with potentially very high upsides as few have the market understanding to be able to resonate with niche demographics in such a way. While we do not offer video explanations and content explanations nor live tutors as many of these platforms do, we recognize that there is not a need for us to do so as already there is so much free content in all sorts of forms out there explaining how to solve the math specific to grades 7-9. Instead, we focus on supplementing in class lectures and explanations with the need for repetition and practice of math with gamified features such that students are actually excited to learn and the actual instructor or parent can track progress and aid in setting learning goals and milestones for the student.

Scalability & Going Forward: While our initial product was very much targeted towards the South Africa diaspora and pulled from a pre-existing set of problems designed around the skill level of the students at Shaya Izibalo Institute, we recognize the bottleneck this will create as we go to scale. We developed our solution by training a generative language model to mimic questions similar to the ones

provided to us by the Institute, but without this primary dataset, securing labeled questions specific to the skill level of different students may prove to be difficult. In an ideal situation, we would adapt the application to the local context of our target market. We'd then customize the content, exercises, and examples to align with the specific curriculum, language, cultural references, and educational standards of the target audience. While easy enough in the South African context, as we were only catering to one particular demographic, this process becomes a lot more cumbersome as we look to expand. Two potential workarounds include a content creation plan that is rooted in scalable design by developing a content roadmap that outlines the creation of additional exercises, lessons, and gamified elements for further grade levels or subjects. Other strategies such as crowd-sourced content creation or partnerships with educators to accelerate content development can also be explored. In the same vein, it is critical that we leverage partnerships with schools, educational institutions, NGOs, or government agencies to expand the application's reach and collaborate with organizations already working in underserved areas to leverage their networks and distribution channels.

Stakeholders:

1. **Children:** The primary stakeholders are the children themselves, as they are the direct users and beneficiaries of the math application. They benefit from an engaging learning experience, improved number literacy skills, and personalized feedback to support their educational growth.
2. **Parents and Guardians:** Parents and guardians play a crucial role as stakeholders. They are concerned with their children's education and seek resources that can enhance their learning. They are interested in the effectiveness, affordability, and accessibility of the math application, as well as its impact on their children's academic progress.
3. **Educators and Teachers:** Educators and teachers are vital stakeholders as they are responsible for guiding and supporting students' learning journeys. They can benefit from the math application by incorporating it into their teaching practices, leveraging the feedback analytics to identify areas of improvement, and utilizing the gamified elements to increase student engagement.
4. **Schools and Educational Institutions:** Schools and educational institutions are stakeholders that may adopt the math application as part of their curriculum or supplemental learning resources. They are interested in the impact on student performance, integration with existing educational systems, and alignment with educational standards.
5. **Nonprofit Organizations:** Nonprofit organizations focused on education, child development, or underserved communities can be stakeholders in supporting or partnering with the business. They may provide funding, grants, or resources to facilitate the distribution and adoption of the math application among underserved locations in South Africa.
6. **Government Agencies and Education Departments:** Government agencies and education departments have an interest in improving educational outcomes, especially in underserved areas. They can be stakeholders in supporting the business through partnerships, funding, or policy initiatives that encourage the use of technology for educational purposes.
7. **Donors and Philanthropic Organizations:** Donors and philanthropic organizations that support educational initiatives, particularly in underserved communities, can be stakeholders. They may provide financial support, grants, or sponsorships to help sustain the business and its mission.

8. **Corporate Sponsors and Partners:** Corporate sponsors and partners, especially those with a focus on education or social impact, can be stakeholders. They may contribute financial resources, in-kind support, or expertise to help the business reach more children in underserved locations.
9. **Research Institutions:** Research institutions can be stakeholders interested in collaborating to evaluate the impact and effectiveness of the math application in improving number literacy among children in underserved areas. They may contribute to research studies, data analysis, and program evaluation.

Revenue Model: Because our core application is specific to serving underprivileged geographies, we needed to alter our revenue model in line with that as opposed to following the typical model of many of the incumbent edtech platforms. While the freemium model seemed the most intuitive for this space, we recognized the counterintuitive nature of building an app designed to help underserved communities that charges users to unlock the entire extent of the available features. And so we shifted our focus to the following primary buckets:

1. **Philanthropic Donations:** Seek donations from individuals, foundations, and corporations that believe in your mission of facilitating number literacy for children in underserved locations. Develop relationships with philanthropic organizations and individuals who are passionate about education and willing to support your cause financially.
2. **Grant Funding:** Apply for grants from government agencies, nonprofit organizations, and foundations that provide funding for educational initiatives, technology in education, or programs targeted at underserved communities. These grants can help cover operational expenses and support the development and maintenance of the math application.
3. **Corporate Partnerships:** Collaborate with corporations or businesses that have a social impact or education-focused corporate social responsibility (CSR) initiatives. Seek partnerships where these companies can provide financial support, in-kind resources, or technology infrastructure to help deliver the math application to underserved locations.
4. **Sponsorships:** Secure sponsorships from companies or organizations interested in supporting education and child development. Offer branding opportunities within the math application or promotional benefits to sponsors. This can include featuring sponsor logos or acknowledgment in the app, website, or promotional materials.
5. **Collaborations with Education Institutions:** Partner with schools, school districts, or educational institutions that serve underserved communities. Work with them to integrate the math application into their curriculum or offer it as a supplementary learning resource. Seek financial support from these institutions in the form of grants or funding agreements to sustain the availability of the app.
6. **Crowdfunding:** Engage with the community, parents, and supporters to raise funds through crowdfunding platforms. Utilize social media and online campaigns to create awareness about your mission and encourage individuals to contribute to the development and distribution of the math application.
7. **Licensing or Partnerships with Organizations:** Explore licensing opportunities with educational publishers, content providers, or other organizations that could benefit from the math application's content or technology. This can involve licensing the app or specific features to generate revenue or partnering to offer bundled educational solutions.

Cost Model: The primary costs could be allocated in the following way:

1. **Technology Infrastructure & Development Costs:** Costs associated with server hosting, cloud storage, database management, software licenses, security measures, and ongoing system maintenance and upgrades
2. **Content Creation and Maintenance:** Hiring subject matter experts, curriculum designers, and educators to develop engaging and effective learning materials that remains relevant and aligned with the curriculum standards.
3. **Localization and Customization:** Adapting the math application to the specific needs of underserved geographies may involve localization efforts. Costs may include translating content into local languages, customizing the curriculum to align with regional education standards, and tailoring the application to suit cultural nuances and preferences.
4. **Partnerships and Collaborations:** Collaborating with schools, educational institutions, and nonprofit organizations in South Africa to reach underserved locations may require investment. Costs may involve building relationships, establishing partnerships, and supporting implementation and training efforts in collaboration with these organizations.