

Building a Strong Foundation: Developing a Curriculum Framework for #TeamGraduate

(OpenAI, 2023)

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In collaboration with Helena Mboti,
founder of #TeamGraduate

Advised by
Dr. Crystal Brown,
Professor Amanda Wittman,
Annie Hughes



(Ongagabrian, 2018)



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Our sponsor, #TeamGraduate, wants to develop an e-learning platform to provide Namibians with an alternative education to increase the pass rate of the national exams. The goal of our project was to provide #TeamGraduate with a curriculum framework as a starting point for future development. Through interviews with Namibian and online educators and archival research of syllabi, we were able to develop the frameworks for three subjects and provide recommendations for the feasibility and future sustainability of the platform. These frameworks account for the unique challenges within Namibian education and the inherent barriers to learning online.

This report represents the work of WPI undergraduate students submitted to the faculty as evidence of completion of a degree requirement. WPI routinely publishes these reports on its website without editorial or peer review. For more information about the projects program at WPI, please see <https://www.wpi.edu/project-based-learning>.

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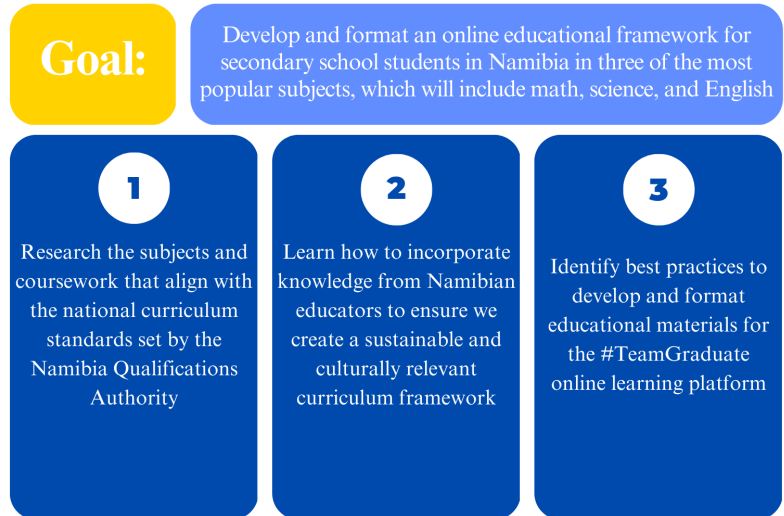
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Background: Assessing Namibian Education and the Goals of #TeamGraduate

The Namibian education system has undergone many reforms post-independence to address the barriers to education but still struggles to provide an equitable education to everyone due to its history of colonialism. #TeamGraduate was established with the idea that those who did not have access to a sufficient education could work towards receiving an alternative but equal secondary school diploma. This chapter provides background information on both education in Namibia and #TeamGraduate. Furthermore, our project goal and objectives are presented in Figure 1.

Figure 1

Project Goal and Objectives

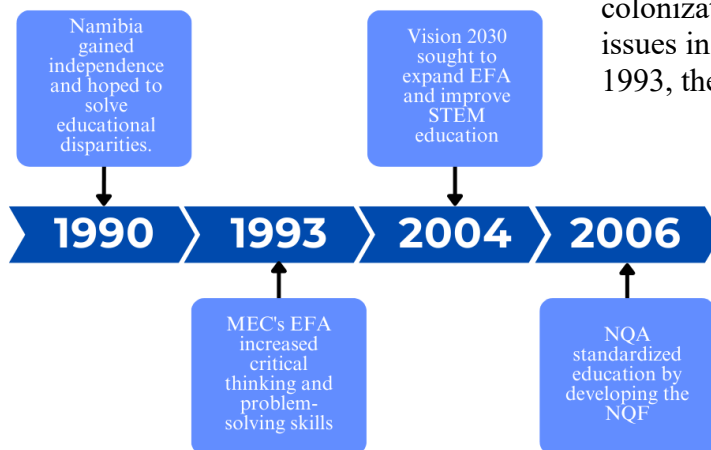


History of Namibian education and influential education reforms

The education system in Namibia has drastically changed several times. See Figure 2 for a timeline of educational reforms discussed in this section. In 1948, South Africa, and Namibia, previously South West Africa, came under an Apartheid regime. During Apartheid, the education system was racially segregated and designed to keep the colonized undereducated and dependent on the colonizers. The Apartheid education regime operated on a system called self-validation reduction (Weston, 1996). Systems of self-validating reduction are designed to reduce the

Figure 2

Timeline of Namibian educational reforms



oppressed population in such a way that it provides the rationale, in the eyes of the oppressor, for the oppression being inflicted. As an independent nation, Namibia alleviated some of the damages incurred during colonization, but addressing the educational issues in the country remained a struggle. By 1993, the newly founded and organized

Ministry of Education and Culture (MEC) released a new educational philosophy focused on healing the broken education system. In the 1990s the MEC sought to increase critical thinking skills and problem-solving skills that would be required for the jobs that would become available (Amukugo, 2017). This would also allow the

next generation of Namibians to be active participants in the upcoming changes, both economically and politically. Unfortunately, this was not the end of educational inequalities in Namibia. Compulsory education, even at the primary level, was not implemented until 2013. This was not expanded to include secondary education until 2016. Additionally, the implementation of the proposed educational reforms during this time was heavily influenced by economic and political growth rather than educational growth for the betterment of the country's youth.

The Vision 2030 was published in 2004 by the Namibian government and outlined the goals for the country that the government hoped to achieve by 2030. The main goals of this plan are stated on its document logo as shown in Figure 3. Without an educated population, the goals of Vision 2030 are unattainable. Access to quality education increases opportunities for higher education and employment. With a lowered unemployment rate comes stability within families and communities, a factor that is vital to achieving the goals of the Vision 2030. One of the main focuses of Vision 2030 was education and the country's plan to proceed with the MEC's Education for All (EFA) program, which was implemented to a limited degree in the 1990s. Based on the goals presented in the Vision 2030 document, the plan for education in science, technology, engineering, and math (STEM) was to "operate a totally integrated, unified, flexible and high-quality education and training system..." (Office of the President, 2004, p. 10). This was an effort to prepare the Namibian youth for the rapid industrialization that would alleviate Namibia's economic disparity. However, several implementation barriers were overlooked. For instance, there was a lack of teachers educated to teach advanced topics within science and math. Additionally, there were few plans to educate teachers on how to bring these topics to their classrooms (Amukugo, 2017). This heightened focus on math and science was introduced at the expense of the arts and humanities. To achieve the goals of Vision 2030 and EFA, the Namibian government implemented several programs to encourage quality education and empower the next generation of the nation's leaders.

However, even with Vision 2030 in place, the implementation of basic education varied vastly across the country. In an attempt to standardize education, the Namibia Qualifications Authority (NQA) was established in 2006 to provide a framework for all the legal qualifications in Namibia and develop a clear understanding of what a person holding a particular qualification has achieved (Ministry of Education, Arts and Culture, 2006). This National Qualifications Framework (NQF) outlined the learning outcomes and necessary requirements for each level which correspond to different degrees and certificates that someone could attain. The NQF established consistency within the education sector and allowed education institutions to become accredited for the services they provide if the educational content aligns with the NQF learning outcomes.

Figure 3

Vision 2030 logo



Prosperity, Harmony, Peace and Political Stability

Note. Image taken from the Vision 2030 document (Office of the President, 2004).

Current challenges within the Namibian education system

Another effort to standardize and streamline education was the high-stakes national examinations to assess students' mastery of the national curriculum. At the end of grade eleven, students complete a national examination at the Namibian Senior Secondary Certificate Ordinary (NSSCO) level, marking the first exit point from basic education in the Namibian education system (Ministry of Education, Arts and Culture, 2016). Passing the examination awards students with an internationally recognized certificate qualifying them for further education in grade twelve and tertiary education systems. Similarly, in grade twelve, passing the Namibia Senior Secondary Certificate Advanced Subsidiary (NSSCAS) level examination allows students to attend higher-ranked tertiary education systems and better employment prospects as compared to the NSSCO certificate (Ministry of Education, Arts and Culture, 2016). However, the reality of the current education system is grim. In the most recent sitting of the NSSCO and NSSCAS, less than 20% of

students passed (Goreses, 2023). For students who do not pass even the first examination, higher education and employment opportunities are fewer.

Moreover, students who have failed either exam have limited means to retake the exams or pursue equivalent degree programs similar to the General Educational Development (GED) in the United States. There currently is a

government-funded program named the Namibian College of

Open Learning (NAMCOL) as a comparable initiative. The goals of NAMCOL are similar to #TeamGraduate as this program aims to improve the educational level of adults and out-of-school youth through an open-distance institution. However, NAMCOL was not implemented effectively as the resources developed for learners were not properly utilized. This was due to the limited access to print-based materials and the gap between the learners' needs and the program's curriculum development (NAMCOL, 2020). While NAMCOL aimed to address issues within the Namibian education system, it failed to be flexible and accessible to the general public. #TeamGraduate intends to improve flexibility and accessibility to education by providing an e-learning platform with a similar aim to improve the pass rate of the national exam. A comparison between these two programs is included in Table 1.

Table 1

Comparison chart of NAMCOL and #TeamGraduate

Proposed Recommendations		
Features	NAMCOL	#TeamGraduate
Materials	Textbooks provided	Online content available
Price	N\$300 per subject	N\$90 per course*
Flexibility	☑	☑
Accessibility		☑
Assessments		☑
Learner Support		☑
Motivation		☑

Note. #TeamGraduate courses are currently N\$90, but the plan is for the online content to be publicly available for free and the only cost to be for writing the national exams.

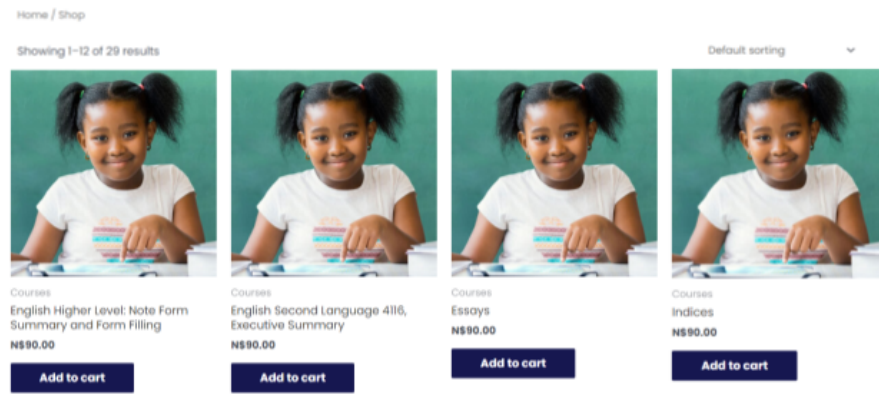
#TeamGraduate: An e-learning platform

#TeamGraduate was founded by Helena Tunga Mboti to provide an alternative e-learning platform for Namibians who were unable to pass the Namibian national examinations. It currently contains a basic curriculum for math and English, as shown in Figure 6. Not only does #TeamGraduate provide online learning modules, but they also have a page on their website for motivation and a career learning hub (*Home*, n.d.). The purpose of #TeamGraduate can be seen in Figure 7. Ms. Mboti

believes Namibians have the potential to go far with their careers but fall short when they do not pass the national exam. In 2017, she had the idea for a passion project to improve educational outcomes for Namibians. Her hope was that Namibians would have a higher chance of achieving higher education and better careers by utilizing the resources her platform would provide. However, her platform launch was postponed in 2020 due to the COVID-19 pandemic. Ms. Mboti is an economist and does not have the background to create course content (H. Mboti, personal communication, February 2, 2023). Therefore, she was seeking contributions from teachers, investors, students, and anyone willing to help her reach her goal of providing the Namibian youth with a more accessible and equitable education via an online platform and thoughtfully designed curriculum.

Figure 6

#TeamGraduate course shop



Note. Image taken from #TeamGraduate website (*Shop - #TGTutors | Team Graduate*, n.d.).

Figure 7

About Us page on the #TeamGraduate website



Note. Image taken from the #TeamGraduate website (*About #TeamGraduate*, n.d.).

Methodology: Developing a Curriculum Framework

The goal of this project was to develop and format an online educational framework for secondary school students in Namibia in three of the most popular subjects, which include math, science, and English. To achieve this goal, we:

1. researched the subjects and coursework that align with the national curriculum standards set by the NQA;
2. learned how to incorporate knowledge from Namibian educators to ensure we created a sustainable and culturally relevant curriculum framework; and
3. identified best practices to develop and format educational materials for the #TeamGraduate online learning platform.

Figure 8

Project objectives and methods

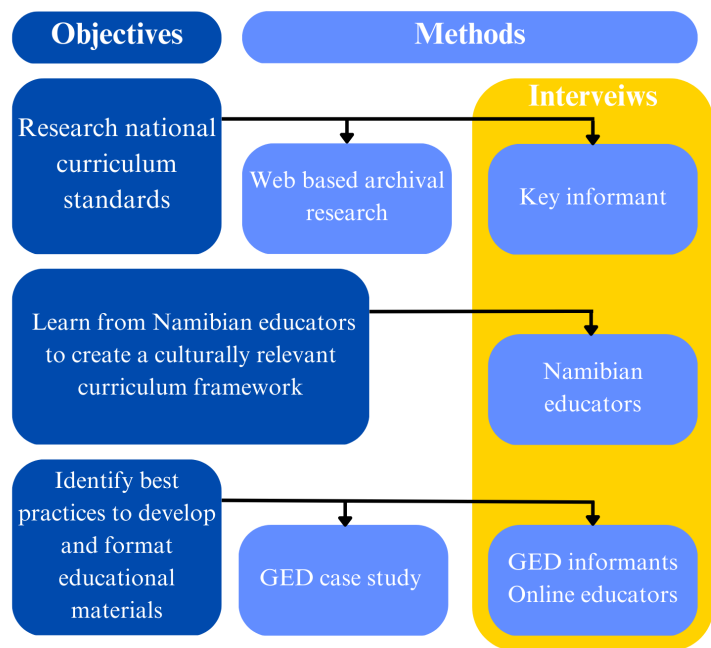


Figure 8 displays the methods we used to achieve each project objective.

Objective 1: Research coursework that aligns with the national curriculum standards

Our first objective was to research the subjects and coursework that align with the national curriculum standards set by the NQA. To better understand the standards and quality of education necessary for the #TeamGraduate course content, we began by conducting archival research. This involved collecting and analyzing documents about the national standards for education which provided the baseline for how we developed the educational framework for #TeamGraduate.

Archival research is a method of qualitative research that involves the study of documents and texts created by organizations, such as businesses and governments, to further increase knowledge about a related subject or topic (Ventresca & Mohr, 2017). Specifically for our project goal, it was essential to incorporate the documents released by government entities such as the Ministry of Education, Arts and Culture, and the National Institute for Educational Development. These government reports informed us how to implement educational policy and national curriculum standards in our project.

To research the national standards, our sponsor provided us with the NSSCO level examination syllabi and practice exams for relevant subjects. Since #TeamGraduate aimed to have a certificate of completion verified by the NQA, we also researched the verification requirements and how the framework we developed aligns with the various NQF levels. Through

web-based archival research into the educational framework in Namibia, we identified relationships between elements of its structure and performed content analysis (Ventresca & Mohr, 2017). For this objective, we utilized an annotated bibliography to record and organize our research. Furthermore, conducting content analysis categorized themes and revealed the necessary components for a curriculum framework.

Objective 2: Learn how to incorporate knowledge from Namibian educators

To achieve our second objective, we interviewed educators that are currently employed in secondary schools. We gathered knowledge about how the Namibian educational standards are implemented in the classroom and how to incorporate local knowledge into our curriculum framework. We aimed to use their expertise not only in education, both online and in a traditional classroom, but also on the best ways to motivate Namibian youth. It was of utmost importance that the content framework we designed was culturally relevant. Shown in Figure 9 is an

Figure 9

Meeting with Namibia University of Science and Technology (NUST) educator, Michael Tjivikua, and our sponsor, Helena Mboti



example of one meeting we conducted to develop the framework. Through interviews with Namibian educators introduced by our sponsor, we were able to accomplish this task. Interviews were conducted to learn about certain aspects of the interviewee's life and their experiences (Knott et al., 2022). We used a semi-structured topic guide to conduct our interviews, as shown in Appendix A. Topic guides or interview protocols provide some structure and direction in the interview but also allow for flexibility based on the interviewee's answers (Knott et al., 2022). This versatility was not achievable through a highly structured interview.

To increase the sample size, we utilized snowball sampling, which allowed us to interview people we may not have had access to otherwise. Our initial interview pool consisted of both traditional and online educators with a variety of subject expertise across several schools. Diversity within the first group of interviews led to diverse interview referrals. We continued conducting interviews until we felt we had the information and resources available to create a framework in the areas specified by our sponsor, as well as adequate knowledge on creating a curriculum framework.

When conducting interviews, we held as many in-person interviews as possible. Face-to-face interviews have been shown to increase the level of trust between interviewer and interviewee but also led to a higher incidence of interview referrals (Kirchherr & Charles, 2018). When we encountered geographic barriers, we employed Zoom interviews. Due to the inherent time constraints of the Interactive Qualifying Project (IQP), not all group members were present at each interview. One group member facilitated the interview and another took notes, recorded observations, and managed the recording system. Permission to record was requested on an individual basis as a convenience. It allowed us to easily transcribe the interviews for reporting purposes.

Once we transcribed the interview, we conducted analysis through coding. Saldana (2015) explained that codes are used to find key phrases, patterns, and categories in our interviews and observations. We then used these codes to gain a more thorough understanding of

the responses we received. Not only were we able to understand how our responses were similar, but we also gained insights into how they might differ based on the individual's experiences. The results of the coding we conducted were also a vital aspect of justifying our results and conclusions.

Objective 3: Identify best practices to create educational materials

To reach our project goal, we needed to create a curriculum framework for the #TeamGraduate website. We used the GED as a case study to identify how to develop and format educational materials most efficiently. The case study allowed for an “in-depth, multi-faceted understanding of a complex issue in its real-life context” (Crowe et al., 2011, p. 1). Additionally, we researched the GED in Namibia—an image of a testing center is shown in Figure 10—as part of our case study to determine the feasibility of a similar program adapted to the Namibian context. Furthermore, we conducted interviews to gather advice from educators and GED informants on how to best create this framework. The interviews with GED informants provided information on the details of the GED program and their experiences, both positive and negative, while preparing for the exams. The initial interviews were with a GED tutor and someone preparing to take the exam. Snowball sampling was used for further interviews. We conducted these interviews over Zoom since the subjects were in the US. The questions can be found in Appendix B.

Since the GED is a program based in the US, we conducted a holistic assessment of the Namibian education system by evaluating the South African education system to ensure our findings were culturally relevant. We chose South Africa as the country for comparison due to its proximity and shared history with Namibia. As a more quantitative measure of comparison, we developed a scoring rubric, included in Appendix H, to assess the curriculum from the GED program and the Namibian and South African education systems. These three curriculums are comparable because they encompass the knowledge required for grade twelve students, or equivalent, to matriculate.

The best way to learn how to create this framework was to get advice from others who have earned a degree and are experienced in teaching. Thus, we used the information obtained from interviews with educators in Namibia, as described in the second objective, and online educators employed in the US to better understand the process of executing and delivering education. We started with two contacts for online educators in the US and used snowball sampling to conduct more interviews. Additionally, the key informant interview with Ms. Mboti provided insight into how the content on the #TeamGraduate website was constructed and uploaded, and the questions can be seen in Appendix C. This interview also supplied the qualitative information needed for decisions on the best practices for the development of educational materials (University of Washington, n.d.). All interviews followed the methods described in the second objective section. The results of our archival research, interviews, and GED case study formed the foundation for the curriculum framework we produced.

Figure 10

GED testing center in Windhoek, Namibia

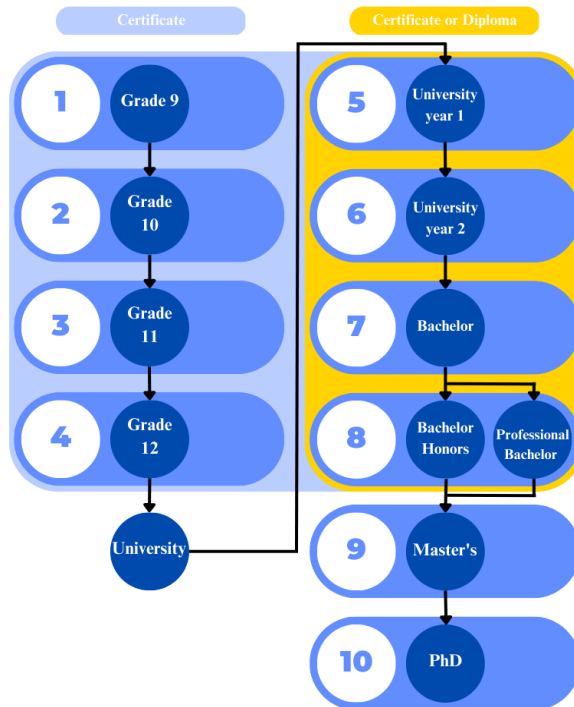


Analysis of Results and Findings

Interviews and archival research into Namibian education gave us useful information for the development of the #TeamGraduate curriculum frameworks. To receive NQF accreditation, we learned that our curriculum must go above and beyond the material covered in the Namibian syllabi. We also conducted two case studies examining comparable education systems, the American GED program and the South African education system. We found that self-directed learning offered freedom and flexibility that traditional schooling did not; however, it required extra discipline and motivation. These findings were corroborated by our interviews with online educators. This informed the lessons and activities in our curriculum framework deliverables and helped us develop additional recommendations to ensure that #TeamGraduate and our curriculum framework continue to develop, expand, and reach the goal of educating Namibian learners after our IQP group leaves.

Figure 11

NQF for the Namibian education system



Finding 1: Accumulation of challenges leads to a rigid and ineffective system

Research about the Namibian NQF revealed the structure and rigor necessary for the curriculum framework we created. Additionally, as a point of comparison, we examined the South African NQF and curriculum syllabus to understand how the Namibian education system compares to those of other African countries. Appendix D provides an organized matrix of common themes and issues regarding the current Namibian education system.

Namibian NQF structure

Figure 11 illustrates the different NQF levels and the corresponding degrees or certificates. Completion of grade nine corresponds with an NQF level one verification. Each successive grade attains the next level of NQF verification, ending with grade twelve and level four verification. A student in a three-year Namibian university achieves a level five certificate upon completion of their first year. Likewise, university second year is level six and completion of a bachelor's degree is level seven or level eight in the case of a bachelor's with honors or a professional bachelor's. A master's degree is NQF verification level nine and a PhD is level ten. Despite the clear and organized structure provided by the NQF, the implementation of the curricula in the classroom remains a challenge. Within the Namibian system, there are three aspects of curricula—intended, implemented, and attained. The intended curriculum describes the syllabi as it is written on paper. Implemented curriculum refers to the result of taking

reference and executing the directives in the NQF. Attained curriculum then refers to the strategies in place for students to achieve learning in the classroom. The challenges and gaps between the implemented and attained curricula are described in detail below, along with the solutions that #TeamGraduate can provide.

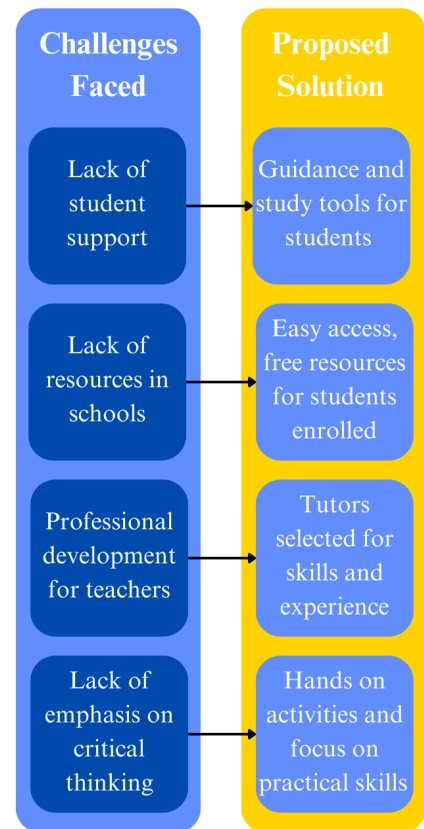
Current educational challenges in Namibia

Through the interviews conducted about the current education system, it became clear that there are challenges within the education system that are creating barriers to student success. It is not uncommon for a Namibian to speak three languages, but many struggle to pass their eleventh or twelfth-grade exams (H. Mboti, personal communication, March 22, 2023). Much of the curriculum is taught at the front of the classroom through lectures with little emphasis on project-based or hands-on learning. In addition, the classrooms are often very crowded, with a high student-to-teacher ratio, making it nearly impossible for the already ill-supported teacher to check in with students throughout the school day. Through correspondence with several Namibian educators, it has become evident that the syllabi are far too extensive, and teachers often do not have enough time in the school year to finish teaching the curricula. Therefore, when students write the exam, they are often tested on materials that they were never taught. This lack of time, paired with a system that does not equip students with critical thinking skills, sets the students up for failure when they encounter new topics on the exams. In addition, “most of the national exams are based on memorization because the kind of questions they're asking—they're at the lower order thinking” (Anonymous, personal communication, March 28, 2023). #TeamGraduate hopes to remedy this by prioritizing the development of critical thinking and practical skills. This can be achieved by providing students with opportunities to engage with the material through hands-on activities and case studies. Case studies also serve to allow students to practice their research skills. As noted in an interview with a Namibian educator, “the system is failing the students rather than students failing the system” (Anonymous, personal communication, March 22, 2023).

Throughout Namibia, particularly in rural areas, the schools are chronically lacking resources. Additionally, the stark contrast between resource availability in public schools versus private schools is evident. It is clear that “[the current education system] does not really cater for a Namibian child’s needs...They don’t think about the poorest of the poorest kids in the system that do not have anyone to help them get resources” (Anonymous, personal communication, March 24, 2023). Textbooks are often outdated and do not reflect the current curricula. Even so, updated textbooks are few and far between. By providing students with ample resources, #TeamGraduate can help supplement the learning that takes place in under-resourced

Figure 12

Proposed solutions for common educational challenges in Namibia



schools. The resources that will be provided by #TeamGraduate are not only free but also downloadable, so students can access them offline. Access to technology is a nationwide challenge, and even when technology is present in schools, it is often underutilized because teachers are not properly trained on how to use technology to enhance their teaching (Anonymous, personal communication, March 28, 2023). This has led to many students graduating or being knocked out of the school system lacking the basic technological skills they will need to succeed in the workforce or in tertiary education. These challenges and solutions are described in Figure 12.

In conjunction with struggles in school, students often face a myriad of social issues in their communities and at home that hinders their ability to succeed at school. Poverty, high suicide rates, and domestic abuse are common in some Namibian communities (Anonymous, personal communication, March 30, 2023). Within these communities, there are organizations, like PAY, that aim to address some of these issues through their afterschool programs. These programs are an example of resources that are already available to students. For instance, PAY provides students with access to tutors, the internet, and a safe, quiet space to study for their exams. Even so, due to the challenges these students face on a daily basis, their personal goals will sometimes shift away from academic goals. Through personal communications with individuals at PAY, it was evident that for some students “it's not even about passing anymore, but just finding themselves again” (Anonymous, personal communication, March 30, 2023). However, access to non-governmental organizations (NGOs) is limited due to a lack of resources within the organizations and a general lack of knowledge about their existence and how to access them among students (Anonymous, personal communication, March 30, 2023). Despite this, NGOs have a very impactful influence on the lives of the students they are able to reach.

In addition to the many struggles students are facing both in school and at home, teachers are also faced with their own unique challenges. Professional development for teachers is not a priority in many schools across Namibia. Teachers often go their entire careers without being evaluated (Anonymous, personal communication, March 28, 2023). Their teaching methods are usually out of date and their understanding of technology is lacking. Furthermore, teachers may be experts in the field they are teaching, but they are not trained on how to be teachers (Anonymous, personal communication, March 22, 2023; Anonymous, personal communication, March 28, 2023). This can lead to an increase in frustration in both students and teachers as they feel their needs are not being met. To alleviate this frustration, the Namibian government has increased the benefits for teachers. However, this did not have the intended effect. Now, many people attending university intend to become teachers to have access to these benefits, not because they have a passion for teaching (Anonymous, personal communication, March 28, 2023; Anonymous, personal communication, March 30, 2023). This has led to a stark increase in graduating teachers and there are not enough schools that offer career guidance, thus leading to job insecurity (Anonymous, personal communication, March 30, 2023). These challenges all accumulate in an education system that is extremely rigid. This rigidity forces students and teachers into a box without the tools they need to succeed.

Comparing the Namibian and South African education systems

To further assess the quality of the current Namibian education system, it was beneficial to research how other African countries similar to Namibia approach education. This added

another layer of involvement to our findings, in addition to the GED case study, to ensure that we were not simply comparing the Namibian education system to that of the US. The South African education system follows a similar pathway for matriculation with a National Senior Certificate (NSC) examination written after completing grade twelve. However, unlike the systemic rigidity and knockout system in Namibia, South African education policy allows adults and out-of-school youth over the age of twenty-one to re-write the NSC, giving them additional opportunities for matriculation (Department of Basic Education, 2021c). Moreover, the first exit point in the South African system is in grade nine. From there, there are multiple pathways to prepare South African youth for the workforce including university, vocational schools, and skill programs as illustrated in Figure 13. This is contrasted with the singular pathway and knockout system in Namibia as illustrated in Figure 11.

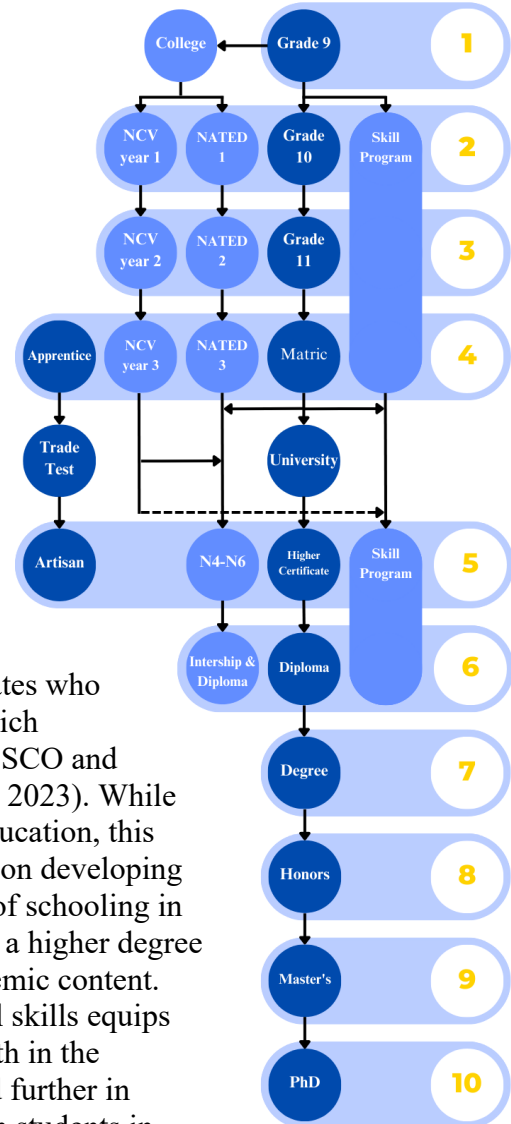
Furthermore, both the Namibian and South African governments devoted over 20% of their total budget to spending in the education sector in 2022 (Education, 2023; Education Budget for Namibia, 2022). However, in 2022, out of a total of 920,634 candidates who sat for the exam, 80.1% passed the South African NSC which juxtaposes the less than 20% pass rate of the Namibian NSSCO and NSSCAS (Department of Basic Education, 2023; Goreses, 2023). While spending a similar percentage of their annual budget on education, this stark difference in matriculation results is due to the focus on developing well-rounded students throughout their compulsory years of schooling in South Africa. The South African education system utilizes a higher degree of focus on applicable skills and less on memorizing academic content. This added emphasis on practical application and technical skills equips students with critical thinking skills that can be applied both in the classroom and in the workforce. Additionally, as discussed further in Appendix E, the availability of resources for South African students in preparation for the examination is much more abundant and easier to find compared to a Namibian student who must rely mainly on resources provided in the classroom. These challenges, inherent to the Namibian education system, can be remedied by online learning platforms where resources and hands-on activities can be readily available to learners with internet access as described in Figure 12.

Finding 2: Necessity of student support in e-learning

To provide students with an alternative method of schooling and to alleviate the inherent challenges to the Namibian education system, we interviewed online educators to understand the advantages and disadvantages of online education in addition to the best way to create the

Figure 13

NQF levels for the South African education system



curriculum frameworks. Appendix F outlines the common themes that arose from those interviews. One of the most common advantages mentioned about online education was its flexibility. The student can navigate through the course at their own pace at any time of the day. However, students need a higher level of self-accountability than in a traditional school setting to ensure they are staying on top of their work. A teacher mentioned that “it requires students to develop those time management skills and the ability to ask for help” (Anonymous, personal communication, March 16, 2023). Through our interviews, we found that check-ins with teachers or tutors help keep the student accountable. Also, an online educator mentioned providing students with a recommended timeline for the course so they can check their progress and aid in self-accountability (Anonymous, personal communication, March 22, 2023).

When creating online course content it is important to keep the students engaged. Most students will be learning from home where there could be various distractions. From our interviews, we learned the importance of having some variance in ways to present the content (Anonymous, personal communication, March 16, 2023). There should be a mix of videos, notes, assessments, and activities. This variance reaches all types of learners: visual, auditory, kinaesthetic, and reading/writing. The biggest struggle with creating this content is fostering interactions between

students. In one of the interviews, a teacher mentioned how they have a “collaboration project... they aren't required to do it with another student, they could do it with somebody at home” (Anonymous, personal communication, March 22, 2023). This adds an element of collaboration to the student’s learning experience.

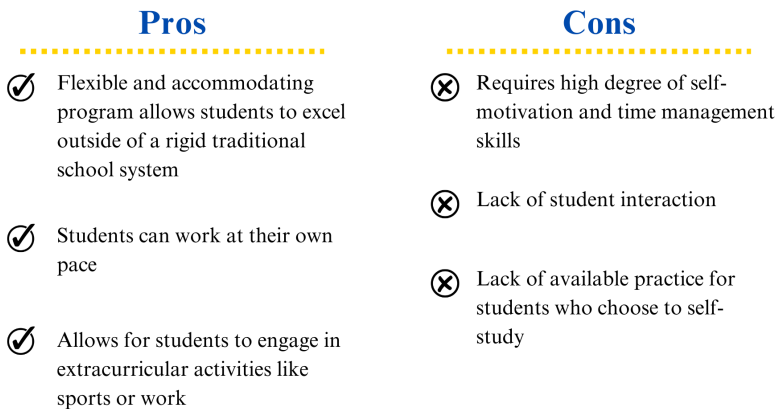
Similar themes of flexibility and self-motivation were

apparent when interviewing GED informants as many were involved with some form of online preparation for the test. Figure 14 compares the benefits and challenges that several GED learners and educators expressed regarding preparing for the GED test. While the flexibility of learning exists both for online schools and the GED, student motivation and quality of education are important to consider to achieve the full benefits of an online program. Additionally, for an online platform, student support must be heavily emphasized, especially for Namibian students.

From the GED case study found in Appendix G, we discovered that although there is a GED testing center in Windhoek, it caters to students who aim to attend universities outside of Namibia. Since the target audience of #TeamGradaute are Namibian students who may not have the best access to learning materials and trained teachers, we can emulate GED preparatory courses by offering tutors and resources to prepare them for the national examinations but place more of an emphasis on student support and motivation to address some of the current educational challenges in Namibia as described in Figure 12.

Figure 14

Comparing the pros and cons of the GED program



Finding 3: Importance of developing critical-thinking and practical skills in curriculum frameworks

In addition to student support and resource provision, we sought to discover the qualities which make a successful curriculum in all aspects. When comparing the GED syllabi with that of the Namibian curriculum, we discovered that the curriculum Namibian students are expected to learn in a year is far more rigorous compared to that of GED learners. As another point of comparison, we examined the South African NSC syllabi for the relevant subjects. We utilized a scoring rubric in Appendix H to compare the learning outcomes of the GED, Namibian, and South African curriculum syllabi in the three relevant subjects. The complete score composition for each course syllabus can be found in

Appendices E and G. We can visually represent the scores of each syllabus as seen in Figure 15. From this bar graph, we can see that in all three subjects, South Africa had the highest score, Namibia had the lowest, and the GED syllabi had the same score across all three subjects.

From these numeric comparisons and our comparisons between the three curriculums in Appendices E and G, we concluded that the score differences are due to the inclusion of practice problems and hands-on activities which foster the development of critical thinking and practical skills. The South African and GED syllabi include real-world applications and encourage interdisciplinary thinking. However, the Namibian syllabi contain a superfluous amount of information that requires students to merely memorize the content rather than learn for understanding. This difference in teaching approach is the cause for the difference in rubric scores and even the matriculation results.

Deliverable: Curriculum framework

Following our research, we utilized the findings about the Namibian education system,

Figure 15

Rubric scores for the Namibian, South African, and GED syllabi

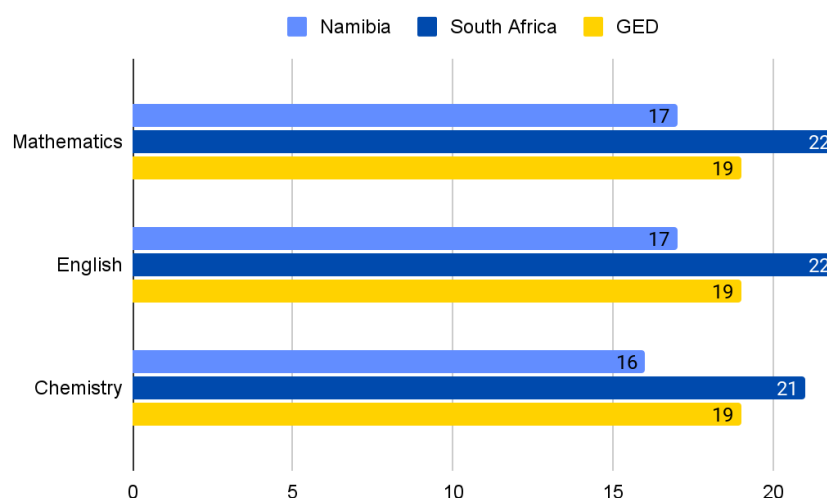
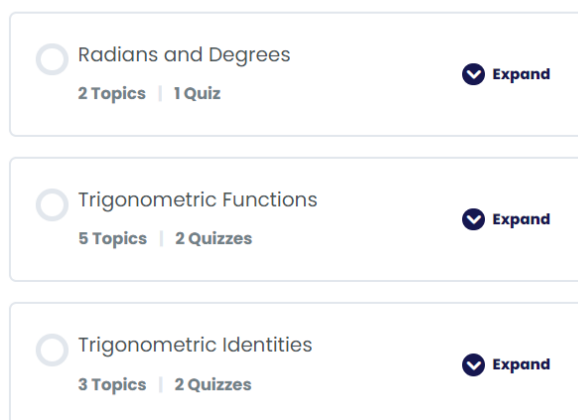


Figure 16

Example module for mathematics framework

MODULE 3: TRIGONOMETRY

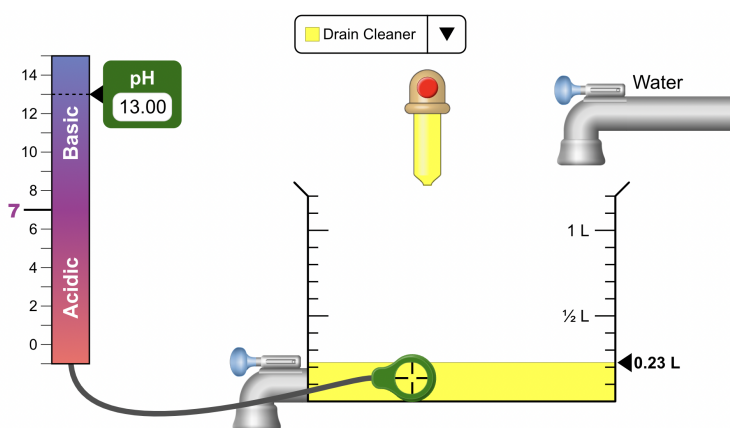


online learning, and the GED program to inform our development of the #TeamGraduate curriculum framework for mathematics, chemistry, and English.

All three subjects contain a set of modules consisting of a series of lessons that reach all specific learning objectives outlined in the NSSCAS syllabus. For each lesson, there will be a set of videos and notes for the student to learn the subject matter provided by a curriculum content creator. Through our research, we found that including diverse content mediums within the course is vital to the student's engagement with the course. This will also help to address the lack of resources available in schools by exposing students to many types of online content that are freely accessible. An example module can be seen in Figure 16. There are quizzes in each module to measure the student's understanding as they navigate through the course. The quizzes will help remedy some of the challenges presented by the lack of student support within the school system. The quizzes serve as formative assessments that can be used as a tool by both students and tutors as an effective way to measure student success and retention. Students should

Figure 17

Example of a chemistry lab activity demonstrating the pH scale.



Note. Online interactive lab activity taken from LabXChange (PhET, n.d.)

Figure 18

Example English assignment

Parts of Speech Assignment

By Caitlin Ho / April 11, 2023

All Courses > Grade 12 English > The Linguistics Elements and Literary Features of Texts > Parts of Speech > Parts of Spe...

The student will copy and paste the chorus from their favorite song and pick out the parts of speech. To do so they will make a list of nouns, pronouns, adjectives, verbs, adverbs, prepositions, conjunctions, and interjections.

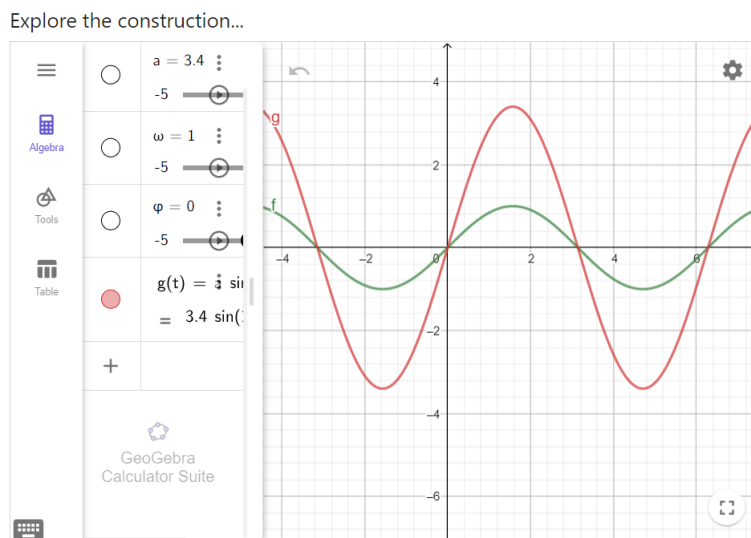
receive a passing score on these assessments before moving on to the next lesson. Figure 17 shows a screenshot of an interactive lab by LabXChange in the chemistry framework to supplement the experience the students would have received in an in-person chemistry lab. LabXChange is a publicly available online library that provides a variety of online resources across many subjects. Many of the available resources are interactive simulations which were included in the #TeamGraduate curricula whenever possible. These types of activities that have been built into all three frameworks are critical aspects of #TeamGraduate courses. In school, there is little emphasis on practical skills and critical thinking. By applying the knowledge that students learn through the course to hands-on activities they are using higher-order skills such as critical thinking and reasoning. This aspect of the course is going to be the key to student success. Additionally, there are case studies included in the chemistry framework, which have been

chosen based on topics of focus in the syllabi. They include basic guidance for students to use when conducting research. Through these case studies, students conduct their own research to develop independent research skills. These skills are important for students entering the workforce or higher education. In the English framework, there are writing assignments for the students to practice their writing skills in preparation for the exam.

Additionally, there are assignments such as the one in Figure 18 in which poems, rhymes, and songs will be used. A Namibian educator mentioned that they use these in their classroom to keep the students engaged and excited (Anonymous, personal communication, March 30, 2023). In the mathematics framework, there are graphing activities through GeoGebra, an online graphing calculator. Some are interactive while others are free-form, allowing students to explore the visual aspect of mathematics. Figure 19 shows an example of such an interactive graphing activity for exploring the amplitude and period of a trigonometric function.

Figure 19

Guided graphing activity on GeoGebra



After constructing the frameworks, we created videos with instructions on how to create course content for each subject. As seen in Appendix K, the videos go into detail on how to add lessons, content, and quizzes, as well as a general explanation of how the students will navigate the course which ensures the feasibility and sustainability of #TeamGraduate.

Recommendations and Conclusions

From our findings, we are able to provide #TeamGraduate with recommendations for the feasibility and sustainability of the platform.

Recommendation 1: Learner-centered approach to #TeamGraduate

We recommend that the #TeamGraduate curriculum should be equipped with sufficient student support and application of its course content to be learner-centered. A learner-centered education encourages students to think critically and develop practical skills. With the development of these skills, students will be able to form connections between subjects and analyze the materials in front of them at a higher level, and be well-prepared for tertiary education and the workforce. From the information gathered in Finding 1, it is evident that the method of teaching in Namibian classrooms and the implementation of the national curriculum are not effective. Although government policy is necessary for nationwide systemic change in the basic education syllabi to account for student support, such as the student-to-teacher ratio in classrooms and content included on the national examinations, #TeamGraduate can still apply a learner-centered teaching style to its program. To do this, #TeamGraduate must consider the implemented and attained curriculum when developing and uploading the educational content on the curriculum frameworks. Oftentimes, the implemented and the attained curricula are not aligned. This is why a learner-centered education is vital. When students are equipped with higher-order thinking and metacognitive skills, they will be able to pursue help and additional resources to bridge the gap between the attained and intended curricula. Moreover, from Finding 3, we discovered that a successful e-learning platform must include practical applications in the curriculum and sufficient resource provision to equip students with the skills necessary in tertiary schools and the workforce. This is also an essential aspect of reaching students with all learning styles. Learning online has many inherent challenges, so #TeamGraduate must cater to all learning styles through a variety of content mediums and activities to keep a majority of enrolled students engaged and motivated. Thus, we recommend that all the #TeamGraduate courses include hands-on activities and practical applications embedded within the modules and lessons following the examples in the mathematics, chemistry, and English curriculum frameworks. This allows students to take control of their own learning and encourages self-motivation.

Recommendation 2: #TeamGraduate digital literacy course

We recommend that #TeamGraduate starts with foundational training on the best practices for online learning and teaching to allow for a low barrier of entry for the platform. Through our research and findings, it has become evident that digital literacy and computer skills are a struggle for many learners in Namibia. As society continues to shift online, developing these skills will be very important for further education and employment. From the information gathered in Finding 2, it is evident that students require sufficient support and motivation for learning online. Therefore, they need to be provided with a digital literacy course on how to navigate through #TeamGraduate. This course should provide students with study tools as it relates to online learning, as well as tips for taking exams and making use of all the resources available to them online. Free online resources are plentiful, and many of them have been incorporated into the #TeamGraduate curricula. However, with computer skills, students will be able to find more resources that cater to their needs and learning styles, as well as cater their study techniques to what will work best for them.

Recommendation 3: Best practices for the #TeamGraduate online platform

Moreover, from information gathered from our interviews, we have formulated additional recommendations to harness the full advantages of online learning. #TeamGraduate should provide students with variable content mediums including videos, texts, current events and news, online laboratory activities, and suggested readings. Not only will this help students connect their learning to relevant real-world examples, but it will help students become well-rounded individuals with well-developed and variable skills. Additionally, #TeamGraduate should encourage students to self-study and provide motivational and time-management tools to help them succeed. This can be approached through the digital literacy course but should be reinforced throughout the course. One way of doing so is to incorporate an AI-generated calendar with recommended due dates based on the student's preferred pace. Students who are able to work on the course full-time should expect to complete approximately two lessons per week, and the AI calendar should send reminders to students if they fall behind this pace. However, students who may work or have other engagements and can only work on the course part-time should complete one lesson per week, and the same reminders should apply. However, the option to change pace should be available at any time during the course should students decide. This motivation and reminders to complete lessons on time, paired with the flexibility to change pace should allow students to receive the benefit of flexibility that comes with online learning but will also help alleviate some of the challenges related to time management and motivation that are inherent to online learning.

We also recommend that AI is built into the curriculum to serve as a diagnostic tool. Students should be required to take an entry exam for the AI to evaluate where they are in terms of understanding the relevant background knowledge for each course. In the instance that the student is able to correctly answer less than 40% of the questions presented in the exam this would indicate that

the student is not prepared to take the chosen course.

However, a score of 70% or more would indicate that the student is well prepared to proceed with the course. When students receive a score of 40% or less, the AI should recommend additional resources or individual topics at a lower level that the student should revisit before taking the course. This would allow students to proceed without retaking entire courses.

As another way to provide additional support, #TeamGraduate can encourage and foster a student-centered learning approach through self-studying and tutoring sessions. Tutors should be available for students when they require additional help on any topic encountered throughout the

Table 2

Further recommendations for #TeamGraduate

Proposed Recommendations	
Student evaluation	Diagnostic AI tool to place students at the appropriate level after they complete a knowledge check test
Remedial learning options	AI should be able to recommend additional resources or individual topics at a lower level which students should revisit
Tutors	Full-time tutors could take on a load of approximately 100 students Students at UNAM and NUST as part-time tutors
Additional staffing	One to two employees for each course for maintenance and creation as well as quality assurance manager .

course. These extra help sessions could be virtual or face-to-face depending on the student's schedule and learning preferences. Additionally, tutors should periodically make themselves available for drop-in sessions if students ever have a need for additional support.

We also propose additional recommendations for the #TeamGraduate website and budget allocations as seen in Table 2 which is explained further in Appendix I.

Recommendations from GED case study

From the discussion in Appendix G regarding the GED case study, we propose two recommendations for the #TeamGraduate website. Although the GED test is available for Namibian students to take, the cost of entry is fairly high for even one subject. Students who have been knocked out of the school system may not have the financial ability to pay for this examination or even tutoring in preparation for the test. Thus, we propose #TeamGraduate provides the online courses for free once the website is operating at full capacity. This allows any learner with internet access to retrieve course content and self-study. Reducing the cost of entry for students on the #TeamGraduate platform will reduce a barrier to education and encourage students. Additionally, from the comparison of the GED and Namibian curriculum syllabi, it is evident that the content Namibian students are expected to learn in a year is overwhelmingly excessive. There is not enough time to teach the content or even ensure that the students are fully understanding the material. As such, we recommend that #TeamGraduate should divide curriculum topics into more manageable sections for students to feel like they are making progress in the courses.

Conclusion

Through our research, we discovered insightful information about the Namibian education system, online learning, and the GED. These findings informed how we created the curriculum framework for mathematics, English, and chemistry on the #TeamGraduate website. From our data collection and findings, we then provided recommendations on how #TeamGraduate can remedy the challenges that exist within the Namibian education system. For the sustainability of #TeamGraduate, we provide thorough recommendations and instructions on how to utilize the curriculum frameworks and website to their fullest potential. Since we only created curriculum frameworks for three subjects, future work on the #TeamGraduate website would include expanding the course selection to include more subjects beyond those required for the national curriculum. For instance, technology-centered subjects such as computer science and engineering should be included to expose Namibian students to different career options. Additionally, #TeamGraduate should create a digital literacy course that is specific to the platform. This course will provide advice for students on how to navigate the website, complete assignments and quizzes, and how to interact with the tutors. Lastly, there is a need to address the systemic issues within the Namibian education system. Our findings should be brought up to the government since many interviewees have expressed their dissatisfaction with the way things are now yet nothing has changed. However, with the implementation of the #TeamGraduate platform as a supplementary program to the Namibian education system, the future of education in Namibia is promising.

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Appendices

Appendix A: Draft interview guide for educators

Goal: To gain perspective on incorporating knowledge from educators into #TeamGraduate's content and to allow a better understanding of how the current curricula are being implemented in schools.

Type of Sampling: Snowball sampling, we will ask educators if they believe there are other people who would be beneficial to talk to.

General questions for all educators

1. Can we record the audio of this interview for our future use?
2. What is the nature of your job in the school system?
3. How do you feel about the education your students are receiving?
4. How do you keep your students motivated and excited to learn?
 - a. Furthermore, what topics are they most excited about?
5. Would you be willing to share some of the educational content you have created so we can use it to inform the framework we are developing for #TeamGraduate?
6. Is there anyone else who you think may be willing to talk to us and be able to provide us with a knowledgeable or unique view?

Specific questions for online educators

1. What is your experience delivering online education? How does developing an online curriculum differ from that of a traditional classroom? What worked and what didn't work?
2. What struggles did you experience when teaching students remotely?

Specific questions for Namibian educators

1. How do you make sure that your course material aligns with the standards set by the national curricula?
2. How do you incorporate local knowledge in your classroom?
 - a. What are some best practices to include local knowledge in the content we create for #TeamGraduate?
3. What do you think is lacking from the current national education system?
 - a. How do you think the current system could be fixed? What changes would you like to see?

For educators for grades eleven and twelve:

1. How do you prepare your students for the NSSCO and NSSCAS?
2. What methods have worked well for students to pass these examinations? What has not worked well?

For educators in tertiary schools:

1. What skills do incoming university students lack that would help them succeed?
2. In terms of math and science, which topics do most students lack an understanding of when they enter university?
3. How do you remedy this gap in knowledge with the incoming university students?

Appendix B: Draft interview guide for American GED learners and educators

Goal: To learn about the implemented practices for the American GED program

Type of Sampling: Snowball sampling, we will ask the GED students and educators if they know other students pursuing a GED certificate or GED educators that would be beneficial for us to talk to.

General questions for learners and educators

1. Can we record the audio of this interview for our future use?
2. What do you think are the main benefits of the GED program versus the traditional American public school system?
3. How does the GED program accommodate students that were/are unable to complete traditional American public high school?
4. What does the GED program do well? What does it do poorly?
5. How do you feel about the education you/your student is receiving?
6. How do you keep yourself/your student motivated to learn?
7. How did you adapt the GED program during the COVID-19 pandemic?
 - a. Were you able to adapt to online learning? If so, how?

Specific questions for educators

1. Is there a reason that you use the GED program as an educator versus using another system, or working in a public or private school?
2. What improvements would you make to the GED system if you could?
3. How do you think the quality of education of the GED program compares to the traditional American public school system?
4. Do you create supplemental materials such as notes, lectures, homework, quizzes, or tests for your students? If so, how do you go about doing this?

Specific questions for current learners

1. What led you to participate in the GED program?
 - a. Was part of this a failure of the traditional American public school system?
2. What reasons do you have for participating in the GED program as compared to not seeking an educational certificate?

Appendix C: Key informant interview with the project sponsor, Helena Mboti

Goal: Gain insights into the #TeamGraduate learning platform and what methods were employed to create and upload the content currently on the website.

Type of Sampling: Key informant interview

1. Can we record the audio of this interview for our future use?
2. What are the goals of #TeamGraduate? What inspired you to create this platform?
3. Who created your current website?
 - a. If it was someone other than yourself, can we get in contact with them?
4. How was the content for the courses currently uploaded to your website created? Where did the ideas for these courses come from?
5. Do you have a sample of the curriculum and/or study notes used for #TeamGraduate?
6. What methods did you employ to upload the content on the learning platform? What worked and what didn't work?
7. How is the content on your website formatted? What types of content are included in your courses?
8. What would you like to see #TeamGraduate achieve overall?
9. Can we have access to the learning management system?

Appendix D: Common themes from interviews conducted about the Namibian education system

Purpose: To organize the coding and analysis of common themes extracted from interviews with Namibian educators

Namibian education system			
Theme	Challenges	Remedies	Quotation
Rigid structure	<ul style="list-style-type: none"> ● Disconnect between national examinations and intellect ● Knockout system ● Students are taking between 5-8 classes with not enough time to study ● Teacher and content focused (only one way of teaching) ● Children are not taught to be critical thinkers ● New syllabus even harder than the previous 	<ul style="list-style-type: none"> ● Hands-on learning and applications for a more learner-centered focus ● Systemic change within the MEAC and with the national curriculum 	<ul style="list-style-type: none"> ● “The curriculum is within a box. It is designed within a box and it is not flexible enough” ● “the system should be designed for people to learn” ● “most of the national exams are based on memorization because the kind of questions they're asking--they're at the lower order thinking.”
Student support	<ul style="list-style-type: none"> ● Underqualified teachers ● Outdated teaching methods ● High student:teacher ratio ● Lack of career guidance ● Little to no choice in subjects students take ● Social issues at home 	<ul style="list-style-type: none"> ● Diagnostic assessments ● Professional development ● Career fairs ● Check-ins ● Personal motivation ● Teaching in the classroom needs to adopt a student-centered approach 	<ul style="list-style-type: none"> ● “the teacher doesn't have enough time to, in most cases, to really elaborate...so that the slowest learner also understands the content” ● “Namibian learners literally need to be pushed for them to do their work”
Professional development	<ul style="list-style-type: none"> ● Lack of consistent requirements ● Teachers are not well supported or trained 	<ul style="list-style-type: none"> ● Need for continuous professional development in new pedagogy and methods for 	<ul style="list-style-type: none"> ● “[teachers are] specialized in the field in the topic they are teaching, but they don't know how to teach”

	<ul style="list-style-type: none"> ● Often teachers are never evaluated ● Teacher workshops are not effective ● Teachers specialized in the field but do not know how to teach ● Teacher benefits as incentive rather than passion for teaching 	<p>teaching and learning</p> <ul style="list-style-type: none"> ● Tele-Teaching 	
Failure	<ul style="list-style-type: none"> ● Low pass rate on the national examinations (<20%) ● Expecting students to fail ● No easy re-entrance into system for those over the age of 18 	<ul style="list-style-type: none"> ● Re-evaluating motivation ● Building a strong student support system ● Need for realignment of basic education curriculum 	<ul style="list-style-type: none"> ● “but [the students] just can’t [pass] because the system is sort of putting them down” ● “the system is failing the students rather than students failing the system”
Resource provision	<ul style="list-style-type: none"> ● Vast differences between private and public schools ● Low resource environment – no textbooks, teachers, technology ● Technology is underutilized even when present in schools ● Knowledge is limited to what they are taught in class and typically cannot access online resources ● Lack of modern life skills (technological aspect) 	<ul style="list-style-type: none"> ● Compiling and summarizing information and materials for students into a textbook ● Life skills at PAY ● Ensure teachers are familiar and comfortable teaching with technology 	<ul style="list-style-type: none"> ● “[the current education system] does not really cater for a Namibian child’s needs...They don’t think about the poorest of the poorest kids in the system that do not have anyone to help them get resources”
NAMCOL	<ul style="list-style-type: none"> ● Expensive ● Lack of student support 	<ul style="list-style-type: none"> ● Progress tracking through consistent assessments 	<ul style="list-style-type: none"> ● “you won’t get enough information that you need in order to pass”

	<ul style="list-style-type: none"> ● Inaccessibility of registering for examinations ● Lack of seats in the most popular subjects 	<ul style="list-style-type: none"> ● Shift enrollment availability to reflect most popular subjects ● Government subsidies for students who qualify 	
Curriculum development and implementation	<ul style="list-style-type: none"> ● Promoting to higher grade without the necessary understanding and skills ● Knowledge gap between students graduating grade twelve and entering university ● Lack of time to teach the syllabus content and prepare students for the exams ● Teachers were not equipped to teach the new curriculum 	<ul style="list-style-type: none"> ● Need for realignment of basic education curriculum ● Professional development and remedial learning ● Accounting for the implementation and delivery of the curriculum ● Continuous monitoring and evaluation while developing curriculum ● Examination prep simultaneously while teaching the content 	<ul style="list-style-type: none"> ● “if they don't know how to do the basic things, then they're not going to have the skills needed to do like the more challenging” ● “they can't write properly, comprehensively. They can't think at the level where they should, and they can't articulate themselves in ways that they should” ● “we can finish [teaching the curriculum] but then that does not determine that the learners literally understand”

Appendix E: Evaluating the South African education system as compared to the Namibian system

Purpose: To supplement the information provided in the report regarding the South African and Namibian NQFs and education systems obtained from web-based archival research.

Comparing the matriculation examinations of Namibia and South Africa

A grade twelve student in both Namibia and South Africa must meet certain minimum requirements to pass the matriculation examination. A Namibian student must obtain enough points for matriculation. These points are accumulated from their performance on various subjects, some compulsory and some optional, at both the Namibia Senior Secondary Certificate Ordinary (NSSCO) and Namibia Senior Secondary Certificate Advanced Subsidiary (NSSCAS) levels. Since the NSSCAS level subjects are at a higher level of rigor, they are weighted more heavily in calculating this score (Anonymous, personal communication, March 22, 2023; Ministry of Education, Arts and Culture, 2018c). Likewise, matriculation in South Africa requires a score of "40% in three subjects, one of which is an official language at Home Language level, and 30% in three subjects" (Department of Basic Education, 2021b, p.37). Furthermore, it is also compulsory to complete a Practical Assessment Task (PAT) to obtain the NSC, which can be achieved in subjects such as agricultural technology, design, or consumer studies (Department of Basic Education, 2021d). The PATs were designed to provide students with knowledge and hands-on experience in the fields most prevalent in the South African workforce and economy.

In addition to the PATs, the academic curricula often coincide with each other. For example, the topics presented in grade twelve chemistry and physics overlap, and the syllabi have been designed to build upon one another (Department of Basic Education, 2011c). This allows the students to make connections between disciplines and understand why what they are learning is important. This is unlike the Namibian curricula which only focus on memorizing concepts from academic subjects that are taught in isolation. Without strong interdisciplinary connections, a student's motivation to fully understand and apply what is being taught is lacking.

In addition to the NSC syllabi, the South African government has published Mind the Gap (MTG) documents for grade twelve learners to study for their exams (Department of Basic Education, 2021a). The MTG documents provide students with a comprehensive study and learning tool that is freely available online to all students. On the other hand, the Namibian education system does not provide comparable resources to students, and thus students must rely solely on what is taught in the classroom. The MTG documents are course specific and include a myriad of helpful tools. Some of which include a full breakdown of the course syllabus with practice problems and important vocabulary, as well as what to expect on exams and tools to help students succeed while preparing for and taking the exams. These documents provide students with an invaluable resource they can use for additional help if they need it.

Comparing the Namibian and South African matriculation examination curriculum

For a holistic comparison between the Namibian and South African education systems, we also examined curriculum syllabi and past examination papers from both systems to understand the rigor of curriculum required in both countries. Incorporating a quantitative approach to this comparison, we utilized the scoring rubric from Appendix H as a common language for assessing the curriculum syllabi from both countries. Refer to Tables E.1 and E.2 to

compare the rubric scores for the NSSCAS and NSC syllabi for mathematics, English, and physical science.

Table E.1

Rubric scores for NSSCAS syllabi in the three relevant subjects

Subject	Score
Mathematics	17 (2+3+3+4+5)
English	17 (3+3+3+3+5)
Chemistry	16 (1+5+3+3+4)

Note. The syllabi used for comparison were found on the NIED website (Ministry of Education, Culture and Arts, 2020a, 2020b, 2020c). Additionally, refer to Appendix H for the complete score breakdown.

Table E.2

Rubric scores for NSC syllabi in the three relevant subjects

Subject	Score
Mathematics	22 (4+5+5+4+4)
English (First Additional Language)	22 (3+5+5+4+5)
Physical Science	21 (2+5+5+5+4)

Note. The syllabi used for comparison were found on the Department of Basic Education website (Department of Basic Education, 2011a, 2011b, 2011c). Additionally, refer to Appendix H for the complete score breakdown.

Mathematics

- Content is comparable to that covered on both the NSSCO and NSSCAS
 - Assessment objectives also similarly phrased but with many more examples and clarifications
- Provides allocation of teaching time and pacing for all the content
- Includes example assignments and projects at the end of each topic

English (first additional language)

- The content is comparable to that covered on both the NSSCO and NSSCAS but is spread out between grades ten to twelve
 - Assessment objectives also similarly phrased but with many more examples and clarifications
- Provides allocation of teaching time and pacing for all the content
- Provides what type of texts should be used for each grade level, how many, and length they should be

Physical Science

- Topics and expected learning outcomes are described to a higher degree and the objectives are less vague
- There is far more emphasis on practical and hands on learning - many topics have activities and labs students can complete built in
- This syllabus also includes some materials required and guidelines for teachers
- The charts are easier to follow and read than the NSSCAS syllabi
- Content is similar to that of the NSSCAS - extremely extensive
 - Included organic chem, thermodynamics, equilibrium, kinetics, & electrochemistry
- Assessment objectives are described at the end of each module
- Modules are broken up into terms - students will complete four terms total
 - One to two themes per term (for both chemistry and physics)
 - Students will complete assessments for each module at the end of the term
- Chemistry and physics are intertwined and often the syllabi are designed to build off one another

Appendix F: Common themes from interviews conducted about online education

Purpose: To organize the coding and analysis of common themes extracted from interviews with educators experienced with online teaching methods

Online education			
Theme	Benefits	Challenges	Quotations
Flexibility	<ul style="list-style-type: none"> ● Caters to more personalized education for students ● Synchronous and asynchronous ● Teaching after hours 	<ul style="list-style-type: none"> ● Accountability 	<ul style="list-style-type: none"> ● “They can take a month or a couple of weeks off... And then come back and make up that time” ● “Giving classes online, because you can do it also after hours since now, I'm currently working. I can do it after hours, and also I'm able to record and send the video, the recordings to my students for extra revision and so on.”
Student support	<ul style="list-style-type: none"> ● Flexibility in check-ins ● Career connections 	<ul style="list-style-type: none"> ● Access to internet and technological resources ● Parents involved in learning 	<ul style="list-style-type: none"> ● “We have something called discussion-based assessments with every module, which goes through certain concepts and make sure that the student is understanding those concepts before moving on.” ● “students that she got needed help in different...modules and...topics and most of them had difficulties with... connection. At that time, they didn't know how to use Zoom. So it was quite a

			challenge now giving classes and also dividing myself now among all these students”
Professional development	<ul style="list-style-type: none"> • Varied methods of engaging students 	<ul style="list-style-type: none"> • Learning curve during COVID on methods of online teaching • Difficulty with managing an online classroom (camera off, background noise) • Communication with students 	<ul style="list-style-type: none"> • “if you were in a classroom and someone didn't turn something in, like, you can just hold them after class. But ...I'm in a position where I have to contact them by like the chat on the platform or email. So it's reliant on like the communication... the communication is a challenge”
Motivation	<ul style="list-style-type: none"> • Independent learning 	<ul style="list-style-type: none"> • Fewer opportunities to work in a team, in-person interaction • Learning curve for self-motivation • Accountability and communication 	<ul style="list-style-type: none"> • “it requires students to develop those time management skills and the ability to ask for help” • “sometimes, the students will, will come in and not realize that or not understand how difficult it can be to, to do online work and to, to have that self-motivation to come in and complete your assignments because there's no, there's no immediate consequence”
Curriculum development	<ul style="list-style-type: none"> • Hands on activities for practical applications and self-exploration • Flipped classroom to allow for questions and more practice 	<ul style="list-style-type: none"> • Student engagement • Lack of collaboration and teamwork 	<ul style="list-style-type: none"> • “Technology is just a tool to accelerate the development of innovative ways of learning and teaching” • “you're not getting as much opportunity to like work in a team

	<ul style="list-style-type: none"> ● Multimedia – videos, articles, podcasts ● Curating pre-existing content and compiling ● Videos can be replayed and reviewed 		<p>and get that team dynamic early and like in person”</p> <ul style="list-style-type: none"> ● “finding ways, especially online, it's a bit of a challenge to them, like, trying to figure out how to get kids excited and like, engaged in a zoom classroom...challenge them and make sure that like they're retaining the knowledge, but in a more fun way”
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Appendix G: GED case study

Purpose: To research the American GED program and provide recommendations to #TeamGraduate for the feasibility of a similar program in Namibia

Examining the GED examination and its implementation in Namibia

Executive summary

Each individual learns at a different pace. Therefore, some students may not excel in the traditional school system. This may be due to learning challenges or demanding extracurricular activities. However, this does not mean that they do not deserve a chance at proving themselves in an academic setting. To provide more flexibility in learning, the General Educational Development (GED) test in the US allows students to continue their education online and prepare for the workforce or higher education without having to be in a traditional high school. Thus, the GED allows students to work and pursue other activities that they would otherwise not have access to while in school. This case study examines the GED exam, its benefits and challenges, and facets that can be applied to the curriculum framework we are developing for #TeamGraduate. #TeamGraduate aims to provide a flexible learning environment similar to the GED. Through #TeamGraduate students out of the Namibian school system will be able to continue their education, as well as provide those still in the school system with a chance to supplement their learning. As a result of this research, we provided recommendations to #TeamGraduate for the feasibility and sustainability of a similar matriculation equivalency program in Namibia.

Background about the GED program

Passing the GED exam provides a student with a certification equivalent to a high school diploma. It provides an alternative method for students to achieve the recognition that they have achieved a high school-level education. Many universities and employers recognize the GED in the US, so passing the exam provides better opportunities for employment and access to higher education. Those who are not enrolled in high school and are at least sixteen years old qualify to take the exam which is administered at official GED testing centers throughout the US (“What Is a GED?,” 2019). The students take the GED exam online with computers provided by the testing center. This method increases access to a broader range of students because it allows students who may not have reliable access to a computer or the internet an opportunity to complete the GED. The flexibility of this program allows for different methods of preparation. Some opt to self-study while others prefer to utilize a private tutor or local GED classes. Preparing to take the GED exam can take students several years, or just several months depending on the chosen method of study.

The GED exam consists of four testing subjects: Mathematical Reasoning, Reasoning through Language Arts, Science, and Social Studies. The mathematical reasoning exam focuses on quantitative and algebraic problem-solving. There is a variety of question formats such as multiple choice, drag-and-drop, hot spot¹, and fill-in-the-blank. The questions assess the learner’s skills and fluency, ability to gain a deeper conceptual understanding, and ability to apply their knowledge to real-world situations (American Council of Education, 2016a). The Reasoning

¹ Inserting a datapoint by clicking on a figure such as a graph.

through Language Arts section focuses on the learner’s ability to read closely, write clearly, and edit and understand standard written English. The layout for this exam consists of one forty-five-minute extended response item as well as multiple choice, drag-and-drop, and drop-down items (American Council of Education, 2016b). The assessment and format of the Science exam are similar to the mathematics one where it assesses the skills, understanding, and ability to apply these to realistic situations with the addition of drop-down and short answer items. Around 40% of the exam contains life science topics, another 40% is dedicated to physical science, and the last 20% is on Earth and space science (American Council of Education, 2016c). Lastly, the Social Studies test contains the same objectives and item types as the science one without any short answer items. The two themes focused on for this exam are the Development of Modern Liberties and Democracy as well as Dynamic Responses in Societal Systems (American Council of Education, 2016d).

For each subject area, a student receives a score between 100 and 200 points that places them in one of four categories: Below Passing, Pass/High School Equivalency, GED College Ready, and GED College Ready+ (*Score Scale and Content Descriptions for the GED Test*, 2023). Students who score between 100 and 144 points in a subject area are considered below passing and considered to “typically have a limited but developing proficiency in demonstrating [subject area core skills]” (*Performance Level Descriptors*, 2016). Students at the Pass/High School Equivalency level achieve a score of 145 to 164. They have shown satisfactory proficiency in the corresponding subject area comparable with the minimum requirements for a high school diploma. Students with a score between 165 and 174 are considered GED College Ready. They have shown strong proficiency in the skill described at the previous levels. Students who achieved GED College Ready+ have scored above 175 and have shown their knowledge and ability of skills described at previous levels and outstanding performance in additional skills (*Performance Level Descriptors Chart*, 2016). A student who achieves GED College Ready+ may be eligible, depending on their university, to receive three semester hours of introductory level credits in the corresponding subject area. However, for someone completing the GED outside of the US, there are only two levels: Below Passing and Pass/High School Equivalency. This system allows learners to demonstrate their mastery of high school education based on their exam scores.

Case evaluation and main findings

Benefits and challenges with the GED program

Benefits:

- Flexible and accommodating program allows students to excel outside of a rigid traditional school system which increases student access to quality education
- Students can choose their own study methods
- Students can work at their own pace
 - Take more or less time as needed for specific topics, whereas in a classroom students must work at the pace of the class.
- Allows for students to engage in extracurricular activities like sports or work
- Rigor is comparable to that of a traditional high school diploma

Challenges:

- Student support – need a good support system depending on student’s needs
 - Some can self-study but others need a tutor for motivation and guidance
 - The self-study aspect of the GED can create challenges for students with learning and attention deficit disorders that are unique from those faced in the traditional school setting.
- Quality of education – practice makes perfect
 - The nature of the GED requires a high degree of self-motivation
- Lack of student interaction – often students taking the GED or pursuing other online degrees do not have strong connections with other students
- Lack of available practice for students who choose to self-study

Refer to Appendix J for a detailed presentation of the common themes which arose from the interviews conducted with GED educators and learners.

GED testing services in Namibia

In Namibia, there is a GED testing center in Windhoek West operated by Paradise Computer Consultancy Services with six available testing seats (GED Africa, 2023). However, this is only the location for which a Namibian student can write the GED test. Thus, students outside Windhoek have limited access to writing the GED exam. Students who seek guidance or tutoring in preparation for the exam must enroll in examination preparatory programs or explore private tutoring or homeschooling options. One such option is the Learnalot program in South Africa and Namibia. This tutoring program provides a year of learning materials, live lessons with an experienced GED tutor, and study groups. However, enrolling in this tutoring service costs N\$1100 per month, which equates to about \$60 USD per month (GED, 2023). This is a large barrier to entry for Namibian students needing additional support in preparing for the GED test.

Furthermore, the GED in Namibia is mainly targeting students who wish to enroll in American universities as it is based in the US. This is not the target audience of #TeamGraduate. #TeamGraduate aims to target students who are looking to attend a Namibian or South African university or students who are preparing to take their high school exams. For students who are planning on attending school outside of Namibia, this program allows them a pathway to do so. However, for Namibians the GED courses are expensive. The cost to write one exam is N\$1469.60 or N\$5878.40 for all four exams. This equates to \$320 USD total, which creates a high barrier to entry for many Namibian students. Along with this, the process to receive the GED diploma is long and expensive. The GED is recognized as equivalent to a certificate at NQF level four, so those wishing to take the GED and attend a Namibian university must buy their diploma and then pay to get it authorized by the NQA (GED Namibia, 2023). For students trying to fast-track their secondary education, this can create a challenge.

Comparing GED assessment targets with NQF learning outcomes

The purpose of this case study was to examine the GED program and see what aspects could be applied to the #TeamGraduate e-learning platform. Since the GED test is based in the US and assesses knowledge based on the American high school system, we sought to compare

the GED assessment targets with the NQF learning outcomes to determine what was relevant for the #TeamGraduate curriculum frameworks. These two syllabi are comparable because they both assess the knowledge a student should possess when exiting the school system after more than twelve years of schooling.

For mathematics and chemistry, the GED is significantly less rigorous than the content included in the NSSCO and NSSCAS level examinations. The NSSCAS syllabus for mathematics builds upon the content taught at the NSSCO level (Ministry of Education, Arts and Culture, 2020c). The content covered at this level goes beyond that of the GED exam and instead covers much of first-year university mathematics, as is common with other education systems abroad.

The NSSCAS syllabi for chemistry are extremely challenging and rigorous for a 12th grader, especially when the level of rigor is compared to that of the American curriculum. For instance, the chemistry syllabus covers approximately two years of a biochemistry degree at a STEM institution in the US. The chemistry syllabi should be adjusted since the content that is expected to be taught and learned in one school year is excessive and as expressed by Namibian educators, often unattainable. The NSSCO chemistry syllabus is more aligned with the GED syllabus and what is generally expected of a high school student in the US (Ministry of Education, Arts and Culture, 2018a). This syllabus covers approximately what is expected for a high school diploma. Given the course load of the average Namibian student, it would be reasonable to split the NSSCO syllabus into two years, potentially covering some of the topics covered in the NSSCAS syllabus. The topics covered in the NSSCAS could be covered during tertiary education.

Table G.1

Rubric scores for GED syllabi in the three relevant subjects

Subject	Score
Mathematical Reasoning	19 (4+2+4+4+5)
Reasoning through Language Arts	19 (4+3+3+4+5)
Science	19 (3+3+4+4+5)

Note. The syllabi used for comparison were found on the GED website (American Council of Education, 2016a, 2016b, 2016c). Additionally, refer to Appendix H for the complete score breakdown.

For a more quantitative method for comparing the learning objectives from the GED and NQF, we formulated a rubric, as seen in Appendix H, to score different aspects that make a good syllabus. See Table G.1 for the rubric scores for the GED syllabi in Mathematical Reasoning, Reasoning through Language Arts, and Science.

Points of comparison between the GED and Namibian curriculum syllabi

Mathematical Reasoning

- The GED exam includes multistep, arithmetic, and real-world problems related to the assessment targets

- GED assessment targets align the most with the NSSCO level learning outcomes
 - NSSCO still has some topics that are not included in the GED assessment targets including vectors in 2D, matrices, trigonometry, statistics, and probability (Ministry of Education, Culture and Arts, 2018b)
- Topics and skills that are deemed important for both tests:
 - Utilizing an electronic calculator
 - Interpreting and presenting information in different forms—written, graphical, symbolic, tabular
 - Systems of measurement
 - Applying combinations of mathematical skills and techniques in problem solving

Reasoning through Language Arts

- The Namibian national curriculum in English is for English as a second language learners
- Reading comprehension and analysis for both NSSCO and NSSCAS are very similar to the GED exam
 - The format of questions (multiple choice, matching, short answer, etc.) is very similar to the GED
- NSSCO
 - Listening and speaking exams (not on GED)
- NSSCAS
 - Writing is very similar to the GED, but again focuses more on the structure and elements than the content of the writing
 - Provided topics on the NSSCAS compared to analysis of a text on the GED
 - The GED looks for the writer to back up their ideas with examples, facts, or details from the text
 - There are two essay responses but there is only one for the GED

Science

- The coverage of GED chemistry is considerably less rigorous than the Namibian chemistry syllabus. Aligns with what is taught at a public US high school.
- Descriptions of what will be covered are concise yet effective and some include examples or applications for what is being taught
- Expectations for reaching the different levels of mastery are clearly defined
- Topics and skills deemed important for both chemistry tests:
 - Thermodynamics, equilibrium, and kinetics
 - Structure of matter
 - Physical and chemical properties
 - Balancing chemical equations & basic stoichiometry
 - Application and analysis of topics presented

Conclusion

Similar to the traditional school system, the GED program has its own unique benefits and challenges. However, through our research and interviews, the GED program can be tailored and adjusted to fit the needs and goals of #TeamGraduate. In completing this case study, it has become apparent that flexibility and student support must be the main focus of any online learning platform. The NSSCO and NSSCAS level examinations are much more rigorous compared to the GED exam, so #TeamGraduate must provide enough support and guidance for students preparing for their national examinations.

Appendix H: Scoring rubric for curriculum syllabi and frameworks

Purpose: To provide a quantitative method for comparing curriculum syllabi from different sources

This rubric scores out of 25 and serves as a measure of the five attributes that we deemed important via our interviews with educators of all kinds. These attributes were rated on a scale from one to five and added together to form an overall score.

Attributes	1	2	3	4	5
Rigor and time	Syllabi is far too extensive given the time constraints	Syllabi content is slightly extensive given the time constraints	Syllabi content is adequate given the time constraints	Syllabi content is teachable given the time constraints	Syllabi content is both comprehensive and teachable given the time constraints
Application	Includes no examples or applications	Includes one example or application	Includes some examples and applications	Includes several examples and applications	Includes an abundance of examples and applications
Implementation	Provides no direction for execution of curriculum in the classroom	Provides little direction for execution of curriculum in the classroom	Provides some direction for execution of curriculum in the classroom	Provides adequate direction for execution of curriculum in the classroom	Provides ample direction for execution of curriculum in the classroom
Format	Syllabi is not clear and inhibits understanding of required curriculum delivery	Syllabi is somewhat clear	Syllabi is clear	Syllabi is clear and easy to follow to a degree	Syllabi is very clear and easy to follow
Evaluation	Provides no description of various levels of understanding and mastery	Provides little description of various levels of understanding and mastery	Provides some description of various levels of understanding and mastery	Provides adequate description of various levels of understanding and mastery	Provides ample description of various levels of understanding and mastery

Appendix I: Website evaluation and budget recommendations

Purpose: To provide #TeamGraduate with recommendations on the website and budget allocations for curriculum development

In creating the curriculum frameworks we also conducted an evaluation of the #TeamGraduate website. The website is easy to navigate and the course creation tools are clear and very accessible. However, there is no auto-save option and when creating the course frameworks it became very tedious to save the draft each time an edit was made. With the addition of an auto-save option creating the courses would be a much more streamlined process. On the other hand, the option to create modules, lessons, and topics allows the creator to clearly and logically break down the courses into smaller and more manageable sections. To make the content designations more variable, having the option to insert labs and activities directly into the lessons rather than as a topic would allow students to see the kinds of content included in each course. Lastly, the option to insert quizzes into the lessons adds the ability for students to measure their progress and retention in just a few short questions. The quizzes could be made more approachable if they were renamed formative assessments. This language changes the connotations behind the assessments and lets students know that the quizzes are merely a tool for them to use as they move through the course. See Figure I.1 for a concise breakdown of the #TeamGraduate website's pros and cons.

Figure I.1

Pros and cons of the #TeamGraduate website

Pros	Cons
<input checked="" type="checkbox"/> User friendly and easy to navigate	<input checked="" type="checkbox"/> Tedious saving mechanism with no auto save option
<input checked="" type="checkbox"/> Modules, lessons and topics allow the course to be broken down	<input checked="" type="checkbox"/> Lack of options for course content types
<input checked="" type="checkbox"/> The quizzes are a good measure of student retention	<input checked="" type="checkbox"/> Quizzes should be renamed to formative assessments

quizzes are merely a tool for them to use as they move through the course. See Figure I.1 for a concise breakdown of the #TeamGraduate website's pros and cons.

Based on the interviews with the online educators, a full-time tutor could take on a load of 100 students per subject and complete a monthly check-in with each student. The number of students enrolled in #TeamGraduate each year would determine how many tutors the platform would need to provide adequate student support. In addition to the full-time tutors, #TeamGraduate should also employ students at both the Namibian University of Science and Technology (NUST) and The University of Namibia (UNAM). Students at NUST and UNAM currently enrolled in an education program could serve as part-time tutors and make themselves available for question-and-answer sessions with students who are seeking extra help. Lastly, #TeamGraduate should be prepared to hire one to two support staff per course added to create content and maintain the website. It is also imperative to hire a quality assurance manager to ensure that the courses being created reflect the current syllabi, are rigorous enough to meet the standards of the NQA and that each course is consistent and streamlined with the others on the platform.

Appendix J: Common themes from interviews conducted for the GED case study

Purpose: To organize the coding and analysis of common themes extracted from interviews with GED tutors and learners

GED case study			
Theme	Benefits	Challenges	Quotation
Flexibility	<ul style="list-style-type: none"> • Serving as an alternate path for demonstrating scholastic ability • Different levels within the program depending on the learner’s needs (comfortably entering workforce, preparation for rigorous university) • Accommodating • Fairly rigorous curriculum that gives GED learner a solid enough foundation to provide future opportunities • Getting results in a more timely, efficient manner • Freedom 	<ul style="list-style-type: none"> • Making own schedule and self-motivation • Logistical challenges made preparation tedious 	<ul style="list-style-type: none"> • “Proving to society that you [are] enough to be useful” • “Moving on to the next phase of life in the most efficient way” • “if school doesn’t work for you, it’s another option that you have”
Student support	<ul style="list-style-type: none"> • Personalized tutoring and additional training • Providing resources for student and review material • Knowing what areas to prep for, where the student is lacking and needs supplemental learning 	<ul style="list-style-type: none"> • Not everyone is homeschooled or utilizes private tutoring to prepare • Lack of in-person support, asynchronicity • Not taking advantage of resources available to the student 	<ul style="list-style-type: none"> • “It can be lonely, boring, and isolating...sit[ting] on the end of a computer, essentially doing assignments and then...checking in remotely periodically”
Motivation	<ul style="list-style-type: none"> • Keeping focused while studying either self-motivation or through a tutor 	<ul style="list-style-type: none"> • Stigma associated with nontraditional school 	<ul style="list-style-type: none"> • “implies that you can’t handle traditional school”

	<ul style="list-style-type: none"> ● Work ethic matters a lot more when preparing for the exam ● Resume building 	<ul style="list-style-type: none"> ● Doesn't have the same value as a high school degree ● Knowing that this program is the right path 	<ul style="list-style-type: none"> ● Specific for students who have a "very capable, sharp mind"
Quality of education	<ul style="list-style-type: none"> ● Tailor instruction to fit student's learning style ● Easier to identify strengths and weaknesses ● Face-to-face tutoring is most beneficial ● Publicly available practice tests with results 	<ul style="list-style-type: none"> ● Workbook does not have enough practice built in, needs to be supplemented with tutoring ● Content is typically vague ● Completing test online and challenges associated with online test taking 	<ul style="list-style-type: none"> ● "being flexible and able to customize and attune to your particular need and skill set"

Appendix K: Content creator video guides for curriculum frameworks

[NSSCAS Mathematics Course Content Video Guide.mp4](#)

[NSSCAS Chemistry Guide.mp4](#)

[NSSCAS Eng SL - Content Creator Guide.mp4](#)