TECHNOLOGY CONSULTING
IN THE GLOBAL COMMUNITY

Final Consulting Report
Agahozo Shalom Youth Village Rwanda
Premices Irakoze & Malak Alseaf
August 2022

Carnegie Mellon University

cmu.edu/tcingc

Agahozo Shalom Youth Village (ASYV)
Executive Summary

Student Consultant, Premices Irakoze & Malak Alseaf
Community Partner, ASYV

.

I. About the Organization

The Agahozo Shalom Youth Village is a youth village designed to offer support to children who are impacted by societal trauma or personal tragedy[1]. It is located in Rwamagana in the Eastern province of Rwanda. The village's main office is located in New York. The village takes in children from the least privileged provinces of Rwanda, offering them the support they need.

The village offers children healing, care, family, and education through its model[2]. It offers children family models, health services, formal education as well as life enrichment applied programs. There is a high school, The Liquidnet Family High School, where students learn English, computer science, and other subjects that prepare them for future jobs or further education.

The village's mission,

> Through healing, education, and love, the Agahozo-Shalom Youth Village
> empowers orphaned and vulnerable Rwandan youth to build lives of dignity
> and contribute to a better world.

II. Implement a Learning Management System for The Liquidnet Family High School

The Liquidnet Family High School uses Academic Bridge in combination with Microsoft 365 and Google as the learning management system. Academic Bridge offered features for creating report cards that teachers can create and students can view. The two systems combined do not meet many of the core requirements of the schools daily functions. Like creating lesson plans and grading

---

[1] https://www.asyv.org/
[2] https://www.asyv.org/mission

assignments. The output of this goal is a One-year Teachmint subscription to which 502 current students were registered. The new system is expected to improve teachers' efficiency in grading, sharing teaching materials, taking attendance, and other class-related activities. The main risk associated with the longevity of this goal is not following the recommendations which consist of training teachers and students and finishing off data migration.

III. Improve the Student Information System for the Village

ASYV currently manages student information using a variety of platforms ranging from CommCare to Google Sheets and Excel. However, there are numerous issues associated with using all of these tools to manage student information.

We believe Teachmint would be a good option for the student information system in the village because it will be connected with the school, eliminating data duplication in the village, it is highly customizable, which is important for the village because it is very unique, and it is less expensive than other options we could find, easily matching their budget. The consultants began the first step in achieving this goal by subscribing to a One-year Teachmint SMS plan and they recommend advising a plan with Teachmint to implement the different departments of the SMS for a successful implementation.

A risk associated with achieving this goal is in training the different employees in the departments on the new system. Each department will have different features and different needs and therefore will need a specialized training session.

IV. Additional Recommendations

Hiring an employee in charge of the systems the village uses will ensure the systems are well maintained and support is provided when needed with no delays. This employee will also be tasked with communicating with the supplier of software used in the village. In the case of TeachMint's SMS this means the system can be ready in half the amount of time it would take the IT employees to get the system running.

Consulting Partner

Jean Claude Nkulikiyimfura

jc@asyv.org

Agahozo-Shalom Youth Village

Rwamagana, Rwanda

https://www.asyv.org/

About the Consultant

Premices Irakoze

Information Systems

pirakoze@andrew.cmu.edu

Malak Alseaf

Information Systems

malseaf@andrew.cmu.edu

Agahozo Shalom Youth Village (ASYV)
Final Consulting Report

Student Consultant, Premices Irakoze & Malak Alseaf
Community Partner, ASYV

I. About the Organization

Organization

The Agahozo Shalom Youth Village is a youth village designed to offer support to children who are impacted by societal trauma or personal tragedy[3]. It is located in Rwamagana in the Eastern province of Rwanda. The village's main office is located in New York. The village takes in children from the least privileged provinces of Rwanda, offering them the support they need.

The village offers children healing, care, family, and education through its model[4]. It offers children family models, health services, formal education as well as life enrichment applied programs. There is a high school, The Liquidnet Family High School, where students learn English, computer science, and other subjects that prepare them for future jobs or further education.

The village's mission,

> *Through healing, education, and love, the Agahozo-Shalom Youth Village*
> *empowers orphaned and vulnerable Rwandan youth to build lives of dignity*
> *and contribute to a better world.*

The school has 502 children, 30 teachers, and 3 administrative staff. A yearly budget of $3.5 million is used to run the village. The village spends $2000 on its information system used for grading and reporting purposes. The current budget set for a system to be used at the school is $2000 per year. Regarding employees, there are two executives and one human resources employee. 3 nurses, 3 social workers, and 2 workers on the public health team. There are 24 family mothers. There are 3

---

[3] https://www.asyv.org/
[4] https://www.asyv.org/mission

LEAP officers, 3 people on the finance team, 2 people for IT support, and 4 operations and logistics officers. There are 2 people working in Alumni, partnerships, and career development offices. There are 3 maintenance and cleaning staff, 3 drivers and 5 kitchen workers. There are 70 day workers who come during the day for work like cleaning and gardening.

Facilities

The school has one connected building. The building has good lighting and depends on fans for ventilation. There are 5 computer labs. Three of the labs have 113 computers connected to the same server. The other 2 labs have laptops issued in 2014. All the students use the computer labs, the laptops are usually reserved for students studying computer science. An average student will use the computer lab for 3-4 hours a week. Teachers have laptops that are up to date.

The computer labs are well protected from climate conditions. The entire village, including the school experiences daily power outages that last for about a minute each. The entire village, including the school, is surrounded by a fence that is under 24-hour surveillance from security personnel.

Programs

The Village has a program called LEAP, Life Enrichment Applied Program. The program encompasses all extracurricular activities of the school. The program includes sports activities, arts, debate, community service, and more. The program director, Jack, uses Google Docs and Sheets in his village and provides a new laptop to manage these activities. He creates plans for the activities and creates weekly and termly reports on the progress of the different entities of the program.

Another program managed by the school is a program designed to provide career advice. The program requires the use of the web where students create E-portfolios and research future opportunities. This program support's ASYV's mission of making the students aware of different opportunities and choosing the right thing to do.

The school uses Microsoft 365, Google Drive, and Academic Bridge to run its day-to-day functions, like taking attendance, generating reports, and sharing material with students. This helps the school deliver the best education as promised to their children to make them leaders in the future. Teachers share homework and assessments through email. Students frequently use Office 365, Excel, Word, and Powerpoint.

The students are sent to the labs where they can complete mentioned assessments, however, teachers are unable to send a whole class to the lab as the more students in the lab the slower the computers become and the more time they need to complete simple tasks.

Staff

The organization has

1. Teachers: responsible for delivering education with high standards, they use Microsoft 365, Google Drive, and Academic Bridge to run their day-to-day functions, like taking attendance, generating reports, and sharing material with students. They use laptops provided by the village, these laptops are new. However, they are reluctant in training and therefore do not make the most of the available features on the apps they have.

2. School administrators: responsible for generating reports and managing the school. They use Microsoft 365, Google Drive, and Academic Bridge to run their day-to-day functions.
3. Executives: Responsible for the village and directing all of its operations. They use Academic Bridge and Microsoft 365 They use laptops provided by the village, these laptops are new
4. Health care workers: maintain student health data, offer health services,s and take students to doctors when needed. They use Commcare to manage the data. They use laptops provided by the village, these laptops are new.
5. LEAP officers: Responsible for extracurricular activities. They use Excel sheets to manage student information, and they have about ten computers that they use for various activities in this department.
6. The finance team is responsible for all the financial functions of the village and they use Quickbook for that. They use laptops provided by the village, these laptops are new
7. The technology team is responsible for maintaining the current technology infrastructure and advising future plans to improve it. They use Salesforce and Comcare to maintain student data specifically. They use personal laptops for that purpose.
8. Maintenance workers are responsible for gardening, plumbing, and such and they use Microsoft 365 on new laptops.

We will be working mostly with the technology team, the school administration, the teachers, and sometimes with the students. The solution we will work on will impact everyone in the organization, but specifically the school.

Technology Infrastructure

Technology	Description
Servers	The village has 3 servers with a capacity of 6TB, each with a 2TB. 1 server is meant to host 8 clients, however, each server is now used for over 30 computers and there are constant complaints about the speed of loading. There are plans to add more RAM to the servers, as currently, it is 48 RAM.
Internet	The WiFi covers parts of the village, but the entire school has WiFi with a speed of 40MB/Sec. The bandwidth is low in Rwanda in general but the internet in the school is not impacted heavily by that.
Computers	The computers' hardware is in good condition. The operating system used is Windows. The computers are all connected to 1 server, making them extremely slow.

Laptops (students)	Students use laptops made in 2014, which have been heavily sued since then by students. The laptops are running into more technical issues faster.
Laptops (teachers and administrators)	Teachers and administrators use their private laptops.
Laptops (LEAP)	Media center for LEAP has 10 laptops
Software programs used	- Comcare - Salesforce - Microsoft 365 - Fortinet - Quickbook - Academic Bridge

The village experiences power outages frequently every day, lasting for about a minute each time. As identified above, the servers are too weak to handle the current systems. The computers used by students also need a lot of improvement. Newer servers and devices would make the village's infrastructure run better, therefore allowing for the successful implementation of new systems.

Technology Management

Deo Kabirigi, an IT coordinator, works for ASYV and is in charge of the village's technology infrastructure. He is in charge of ensuring that the computers in the labs, the projector across the school, and the internet in the village are working. When Deo is not present, Justin, an IT specialist, fixes the majority of the computers and ensures that the majority of the IT-related issues are resolved.

When people in the village have problems with their computers or internet connectivity, they usually contact Justin or Deo to resolve the problem, and the majority of the problems are related to equipment maintenance and internet connectivity. When problems escalate, they usually go to Kigali to find the right person for support, and it's usually a hardware issue because Justin and Deo are well-versed in software.

Deo and Justin are the only ones in charge of troubleshooting and operational task management, which includes backing up critical data, installing and updating software, and updating virus definitions on an ad-hoc basis. Because the IT team is constantly overloaded, we believe there is a clear need for more people to assist them in managing technology.

Technology Planning

Deo is also in charge of planning and budgeting for technology infrastructure, as there is no other committee in charge of planning and budgeting. If villagers have any technological needs, they can send a request to Deo, who will include them in the next year's budget.

They typically have a six-year technical plan in place, but the majority of the items on the plan are not implemented. For example, they planned to replace their laptops every 5 years, but now their laptops are 7 years old and no longer run efficiently because these computers are used daily.

One of the main issues they face in all areas of information management is internet connectivity, which includes internet coverage and speed, which may impede the use of technology in the village. They increased internet speed from 20Mbps to 40Mbps, but computers in their labs are still slow because the computers are old and their servers aren't powerful enough. One of the problems with their technology plans is that it takes a long time for something to be approved by the director based on the availability of funds.

Communication

ASYV has a mechanism to share files internally using their servers, but they prefer to use email or WhatsApp because it is more convenient and can be done on their phones. ASYV has internet access and a website to support its mission, which is regularly updated with information about activities in the village. The organization doesn't manage the information for its donors and founders because it's mainly managed by its office in New York. Communication with Student families is mostly done through their phones and they use the academic bridge to send them some information like student reports.

The main issue they have with communication is the length of time it takes for people to respond to their emails and their weak server that can not support a good intranet. They had issues in the past with their servers being burned, but luckily they had backups for all the data, so the operation in the villages continued as usual; they only needed to replace the server but it discouraged them from using Intranet.

Besides computer communication, most of the other communications are done using paper. Most of these are orders and invoices mostly because most of these documents are generally paper-based in Rwanda and most of the people are computer illiterate. The problem with this paper-based communication is that the process to get anything from the village takes longer than expected and if they could make them digitally most of the process will be quicker than they already are.

ASYV is generally active on social media; they primarily use YouTube, Facebook, and Instagram to raise awareness about the school and raise funds, as the majority of their funding comes from donations. We would advise them to increase the number of posts they make on social media to maintain their presence.

Information Management

ASYV manages information primarily electronically, but they do not currently have a consistent data management system. Because their systems are not linked to a single database, there is a lot of

data duplication. Data is primarily collected using Papers and Google forms, and this data must be collected and transferred to different platforms used by various departments. ASYV also has a large amount of critical data because they collect vital information on each of 502 students several times a year. Improving their information management methods is thus an important goal for ASYV.

Current databases include databases created for various purposes by the Monitoring and Evaluation Officer, the health and wellness department, and at the school, and they are mostly created by their staff. Because information enters ASYV in a variety of forms, they have been unable to automate information management processes. One of their issues is figuring out how to improve their databases so they don't have to enter data multiple times. Improving information management will enable ASYV to more closely monitor students' progress and intervene as needed, which can be accomplished by creating a single database where they can manage all of their information.

Business Systems

The majority of ASYV business systems are developed in both New York and Rwanda. ASYV has a well-functioning finance department. Christine Icyigetse is the Director of Finance, and the department also includes two accountants, Janet Mutesi and Noella Nyamuniga. Quickbook is a software program that is used to manage payroll, salaries, and employee information. Employees can also be reimbursed for their expenses.

II. Implement a Learning Management System for The Liquidnet Family High School

Motivation

The Liquidnet Family High School uses Academic Bridge in combination with Microsoft 365 and Google as the learning management system. Academic Bridge offered features for creating report cards that teachers can create and students can view. Microsoft 365 was used for storing and accessing different files, and Microsoft emails were used to share resources and assessments with students. Google was used for sharing files as people added each other as collaborators and worked together on documents. Apart from that, the school's system lacked many features of a learning management system. Therefore the school faced the problem of slower processing of learning information as no system provided features like attendance taking and creating assignments.

The system will serve the needs of the school which was not met by the existing system. A lot of time and effort is wasted as teachers and admins try to make a learning management system out of the tools they have. Using excel and word documents was inefficient, there was no way of taking attendance, giving out assignments, and grading them easily. Students do not have comprehensive profiles. Having a proper LMS will save teachers, admins, and students time by allowing seamless interaction between the entities of the system like assignments, attendance, violations, and many other things. The centralized system will make it easy to view a student profile and make quick decisions. It will also allow teachers to grade assignments and create reports efficiently.

A lot of research was done on alternatives, as detailed in the appendix. There were mainly two types of alternatives. One is buying an off-the-shelf solution and one was building an LMS for the school. The alternatives were evaluated according to meeting the functional and non-functional requirements of the school.

TeachMint offers 17/18 of the functional requirements needed by the school at a relatively low price. Upon meeting with the company representatives we were able to conclude that the system is highly customizable so a team will be allocated to implement the customizations needed by the school. In addition, the company offers maintenance during working hours so there will be no need to hire an employee to maintain the system.

PowerSchool and Alma would offer the same services with a better user experience and a better interface. However, both these solutions went above the budget.

Our team concluded that Teachmint is the best solution for the problem the school is facing with the learning management system. The system will serve the needs of the school which was not met by the existing system.

Outcomes

We were able to add student and teacher biodata to teachmint, which consists of 502 current students, approximately 410 alumni, and 30 teachers. We also managed to train four administrative personnel on different modules that are very useful for learning management systems.

Activities

- Interview a teacher, dean of students, and school principal.
- Identify what features the admins, students, and teachers need and create an ERD map to communicate the structure to Teachmint.
- Multiple software packages were evaluated and a decision matrix was created to aid in choosing the best solution (see appendix).
- Facilitate payment for the new system.
- Collect and download excel sheet formats of the data in Academic Bridge and Commcare
- Merge the excel sheets to match formats provided by Teachmint.
- Migrate the data into the new system with the help of TeachMint.
- Facilitate and conduct the training.

Outputs

- Proposal outlining the goals and frame of the project.
- Presentation to stakeholders explaining the choices made regarding the new system (see appendix).
- One-year Teachmint subscription.
- 502 current students were registered.
- 30 teachers were registered
- Entered the school timetable and student data in the system.
- 5 days of training for 4 admins and created 4 admin accounts.

Outcomes

- The new system is expected to improve teachers' efficiency in grading, sharing teaching materials, taking attendance, and other class-related activities.
- Teachmint will allow teachers and admins to work around common power outages by offering a mobile application where many of the activities can be done, like taking attendance.
- A good and understanding relationship was established between the school and Teachmint, making further improvements easier.

Indicators

- Admins have expressed comfort using the new system compared to the old one

Note: More indicators will follow once the system is used by teachers because they are planning to start using the system in September.

Recommendations

Completing data migration in August

Since the school year will begin in October, the training will take place in September. Therefore, it is important to have all the necessary data migrated by the end of August. This will ensure the training goes smoothly so that when the school year starts no changes to the system will occur on the system. Ensuring this efficient transition will allow for a better user experience for teachers and reduce resistance to change, making the system more successful.

Steps:
1. Contact Teachmint about migrating the rest of the Academic Data from the Academic bridge.
2. With help of the Dean of students, come to an agreement on what data to migrate from Academic Bridge and what to leave behind.
3. TeachMint will use the sheets prepared by the consultants (available on the drive: https://drive.google.com/drive/folders/1GosF8oyAzfk-aSMrb0yp0YUgUSQtcCQl)

Resources:
1. Teachmint customer success team: the team will ensure the successful migration of the remaining data, they also have access to the sheets prepared by consultants.

With the support of the Teaching team, create credentials for students and teachers before teachers' training begins

As soon as the new students' data is finalized and migrated, it is important to create credentials for current students, Alumni, and teachers. The Teachmint customer success team will be available to help with this process whenever the IT director is ready. Working credentials will be important for smooth training for teachers and later a successful transition for students as well.

Steps:
1. Determine the preferred form for students' credentials (name/id number/ unique combination of name and ID)
2. Communicate the preferred format to TeachMint and they will create the credentials
3. Test that the credentials are working

Resources:
1. Use the existing credentials to determine the best format of student IDs going forward, also available on the Drive.
2. Teachmint customer success team: the team will ensure the credentials are created and ready to use.

Train students and teachers

As mentioned earlier, it will be important to conduct elaborate training for teachers. One of the risks we outlined earlier was the resistance to change that comes with any new IT project. In order to best counter that, we recommend the IT director hold training sessions for teachers. Teachmint is willing to provide as many training sessions as needed for teachers. This is important as training the teachers will ensure the system gets tested and used by the main users before the school year begins.
Steps:
1. Schedule 3-4 1-hour training sessions for teachers with the help of TeachMint
2. Introduce the system to the teachers and outline what will be covered in the training sessions (This will be provided by TeachMint when you request it).
3. Conduct the training sessions and allow for space for asking questions.

Resources:
1. Each teacher and Admin needs to bring his/her laptop. This will allow each teacher to see and try the system on their own device and ensure it works well.
2. Ensure there is a good internet connection, having a good connection will ensure the training sessions go smoothly with no interruptions.
3. Contact the Teachmint customer success team for the specifics of each session.

III. Improve the Student Information System for the Village

Motivation

ASYV currently manages student information using a variety of platforms ranging from CommCare to Google Sheets and Excel. However, there are numerous issues associated with using all of these tools to manage student information.

With the use of CommCare, both the Clinic and the Parental Departments have raised various concerns. They have stated that the interface is not user-friendly, so they are unmotivated to use the platform, and one of the team members stated that they would rather use Google Docs to type their notes than CommCare. They also have issues with the platform's form because they are unable to edit information on the forms when they have additional information about a student, so once it is submitted, they must redo the form, which leads to data duplication and errors in the reports due to a large amount of duplicated information. As a result, they sometimes manually analyze data from the database. They have also raised an issue with viewing information in the database, as they always have to ask the IT person to give them the submitted records so that they can do their reports, and they have stated that they would like to have another tool that would help them to visualize submitted that easily, which would save them a lot of time while managing student information.

The LEAP(Life Enrichment Applied Program) department heavily relies on Google Sheets and Excel, and they have many excel sheets with student information, which leads to a lot of manual work in more than 9 activities in LEAP. They have expressed concern that they are time-consuming, and they spend the majority of their time trying to complete a report every Thursday on student attendance at all activities, as well as the term report, in which they consolidate all data for about 10 weeks of activities in the villages per term.

By improving the existing systems, CommCare for the Clinic and Parental Departments and Excel for LEAP, they will be able to save a significant amount of time spent on reporting, which was a concern raised by both departments. It will help the village manage student information more efficiently because there will be no data duplication. The enhancement will also improve communication between village departments, such as when the clinic wants to notify a teacher that a student will be unable to attend class due to medical reasons. It will also improve data visualization for both clinic and parents, as well as provide editing options for submitted forms. They will also have easy access to a student profile, which will allow them to easily analyze their medical history for the clinic or student performance in school activities for the LEAP program.

There weren't many options for student information system programs that also offered to learn management systems, but we did find two: PowerSchool and TeachMint.

PowerSchool was an excellent option because it has a good reputation and a user-friendly interface, and it would help the villages improve their student information system, but it was an expensive system that was beyond the budget that we were given by the school because the LMS only cost the school $10,200, and the student information system cost them $21,590, both for 500 students per year.

Teachmint, on the other hand, is going to improve their student information system as well and works in many different countries compared to PowerSchool, implying that they have more experience customizing for different schools but their interface is not as user-friendly as PowerSchool but it's better than CommCare that they are already using and the price is cheaper than PowerSchool as for LMS it will cost $2500 and student information system will cost $3500 both per year for 500 students. Luckily, we were given a 50% flat discount as a special school discount if they chose to use both the LMS and the Student Information System, which would cost $3000 for both.

We believe Teachmint would be a good option for the student information system in the village because it will be connected with the school, eliminating data duplication in the village, it is highly customizable, which is important for the village because it is very unique, and it is less expensive than other options we could find, easily matching their budget. It will also be simple to maintain because Teachmint will provide customer support for the village and will be in charge of removing bugs from their system. They will also ensure that the system's data is secure. Because teachmint will be responsible for their learning management system as well, the village will be able to use a single system for the majority of their needs. It will also increase employee satisfaction, as the people we interviewed expressed various concerns about the system they are currently using.

Outcomes

We were able to add student and teacher biodata to Teachmint, which consists of 502 current students, approximately 410 alumni, and 30 teachers. We also managed to train four administrative personnel on different modules that are very useful for learning management systems.

Activities

- Interviewed the Life Enrichment Applied Programs (LEAP) officers and identified their use of the system and the features they need.
- Interviewed nurses at the clinic and parental wholeness department and identified their use of the system and the features they need.
- Observed the daily activities of the village and considered including more of them in the system, like a transport schedule for buses.
- Identified the pain point for the departments mentioned above and specified the features they need for a better system.

Outputs

- One-year Teachmint subscription.

Outcomes

- Yet to be determined after implementation

Indicators

- Yet to be determined after implementation

Recommendations

<u>Advising a plan with Teachmint to implement the different departments of the SMS</u>

As outlined earlier the Student Management System will be an essential component of the suggested solution, therefore we recommend that the IT director communicates with TeachMint to devise a plan on the implementation of the student management system. The consultants have already communicated the needs of the three main departments: parental wholeness, clinic, and LEAP.

Steps:

1. After recommendations for the LMS are complete, the IT director meets with Teachmint and expresses his interest in starting the implementation of the SMS.
2. Teachmint will provide all the necessary steps needed.
3. IT director implements the recommended steps by TeachMint

Resources:
1. TeachMint customer success team. As promised, the customer success team will ensure the successful implementation of the SMS.

IV. Additional Recommendations

Hiring an IT in charge of the new System

Earlier in the report the employees of the village are listed and their roles are described. It can be seen that there is no employee/group of employees whose main responsibility is maintaining technology in the village. Just like any other organization that uses any sort of information system, it is important to have someone tasked with maintaining the data, resolving issues and being on call in case the system goes down.

During the consultant's time at the village it was not difficult to pinpoint who is the go to IT employee, however we also noticed that the same employee has a variety of different tasks and is frequently caught up with issues related to hardware. The IT Director also has plenty of other non-IT related tasks. Overall, it was very hard to get time to consult and talk to the people in charge of general IT. It is then safe for us to conclude that a new system will be one more task these two employees have to do on top of their workload. That approach is inefficient, as a new information system for the school will be used all the time, meaning, users will need support around the clock.

Hiring an employee in charge of the systems the village uses will ensure the systems are well maintained and support is provided when needed with no delays. This employee will also be tasked with communicating with the supplier of software used in the village. In the case of TeachMint's SMS this means the system can be ready in half the amount of time it would take the IT employees to get the system running (according to the consultants' estimation after observing operation in the IT office).

To implement this recommendation, the village should find a person with expertise in information systems, and a person who is willing to learn fast as these two criteria are enough since the village is not building anything from scratch.

About the Consultant

Premices Irakoze is a junior in Information Systems with a minor in Global system management at Carnegie Mellon University in Qatar. She will be taking part in the Technology Consulting in the Global Community internship over the summer and return in the fall to start her Senior Year.

Malak Alseaf is a junior in Information Systems with a minor in Business Administration at Carnegie Mellon University. She will be taking part in the Technology Consulting in the Global Community internship over the summer at Agahozo Shalom Youth Village and return in the fall to CMU-Q to finish her final year at university.

Appendices
Appendix A.

<u>Training videos</u>

Day1: Institute management
https://drive.google.com/file/d/1uPOKxBpW78vmNx_fgCiZG4vmRkAABkFf/view?usp=sharing

Day 2: Inquiry & Admission, Material Upload, Academic Planner
https://drive.google.com/file/d/1JpkseJvB1QqY1w7JkVE0zay6Prw_6o_0/view?usp=sharing

Day 3: Student Attendance, Calendar Analysis, Exam Planner & Scheduler
https://drive.google.com/file/d/1JpkseJvB1QqY1w7JkVE0zay6Prw_6o_0/view?usp=sharing

Day 4: Time Table, Lesson Planning, Assignment, Birthday
https://drive.google.com/file/d/1RsSGwyrFZ598PUJ0gQCwi8GshTAh6BJc/view?usp=sharing

Day 5: Live Class, Content Sharing, Application View
https://drive.google.com/file/d/19WpIF0WVjLICTFKSnNirUMo5vztMmTvU/view?usp=sharing

Appendix B.

<u>Function requirements and Alternative Solution</u>

The first functional requirement of the system was data management, does the system offer:

1. Students lists: By grade with full bio-data from recruitment, by combination, and by family.
2. Staff lists: with full biodata (As required by REB reports)
3. School materials by categories for inventory purposes.

Table 1 summarizes how well each alternative met the requirement.

	Custom-made	PowerSchool	LMS 365	Teams	Alma	TeachMint	Academic Bridge
Students Lists	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Staff Lists	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
School Materials	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

Table 1

The second functional requirement we analyzed was academic needs. Does the system offer:

1. Teaching and learning materials including course syllabus, lesson plans, presentations, notes, videos, simulations, and lesson assessments.
2. Assessments such as homework, quizzes, tests, feedback reports, and exam past papers with marking schemes/guides.
3. Attendance recording by teachers every period.
4. Professional development ability to create portfolios, CVs, etc.

Table 2 summarizes how well each alternative met the requirements,

	Custome made	PowerSchool	LMS 365	Teams	Alma	TeachMint	Academic Bridge
Teaching and learning materials	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Assessments	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**
Attendance recording	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**YES**
Professional development	**YES**	**YES**	**NO**	**NO**	**NO**	**YES**	**NO**

Table 2

The third area of functional requirements we analyzed was Reports. Does the system offer:

1. Attendance reports per grade, class, and family (Daily, interval, and general)
2. Assessment reports by EY entry placement test, assessment type (Teacher's spreadsheet), mid-term report, exam report, general end of term reports, language skills, by unit assessment.
3. Projects reports by department (Science, IT, Humanities, Language, Mathematics)
4. Weekly report
5. Report card (Termly, annually)

Table 3 summarizes how well each alternative met the requirements.

	Custom made	PowerSchool	LMS 365	Teams	Alma	TeachMint	Academic Bridge
Attendance reports	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**YES**
Assessment reports	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**NO**
Projects reports	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**NO**
Weekly report	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**NO**
Report Cards	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**YES**

The fourth area of functional requirements we analyzed was Analytics, planning, and communication. Does the system offer:

1. Percentile- School percentage, Grade percentage, combination percentages, and subject percentages.
2. Aggregates: by the individual, by class ranges (73-70, 69-59, 49-39, 29-10, and below 10)
3. Standard deviation - by grade, by combination, and by subject.
4. Trend analysis - By grades, by combinations, by subject, and with filtering option.
5. School plans such as schedules, calendars, school improvement plans, action plans, departmental plans, schemes of work, course syllabuses, event plans such as science day, language day, environment day, etc.
6. Automated alerts and notifications: Chat with individuals, groups, and the entire school, noticeboard posts, upcoming events notices (Pop-up), time spent on the platform, etc.

Table 4 summarizes how well each alternative met the requirements.

	Custom made	PowerSchool	LMS 365	Teams	Alma	TeachMint	Academic Bridge
Percentile	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**YES**
Aggregates	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**	**YES**

Standard deviation	YES	YES	NO	NO	YES	YES	YES
Trend analysis	YES	YES	NO	NO	YES	YES	YES
School plans	YES	YES	NO	NO	YES	YES	NO
Automated alerts	YES	YES	YES	YES	YES	YES	NO

Table 4

As can be seen, the custom made solution, PowerSchool, TeachMint, and Alma offer most of the functionalities. However it is important to note that the custom-made solution is a special case as although the features can be implemented, it will be time-consuming as will be outlined by the end of this analysis.

Nonfunctional features were evaluated and given scores according to meetings conducted with the different companies. For the custom-made solution, non-functional requirements were not evaluated as they are implemented as the system is being built.The nonfunctional requirements needed in the school system include

1. Portability and compatibility: Which hardware, operating systems, browsers, and their versions do the software run on? Does it conflict with other applications and processes within these environments?

PowerSchool	LMS 365	Teams	Alma	Teachmint	Academic Bridge
100%	100%	100%	90%	100%	100%

2. Performance and scalability: How fast does the system return results? How much will this performance change with higher workloads?

PowerSchool	LMS 365	Teams	Alma	Teachmint	Academic Bridge
100%	100%	100%	95%	100%	100%

3. Security: How are the system and its data protected against attacks?

PowerSchool	LMS 365	Teams	Alma	Teachmint	Academic Bridge
95%	95%	95%	95%	95%	95%

4. Reliability, availability, maintainability: How often does the system experience critical failures? and how much time is available to users against downtimes?

PowerSchool	LMS 365	Teams	Alma	Teachmint	Academic Bridge
99%	99%	99%	99%	95%	90%

Next, the alternatives were evaluated according to price as summarized in the table below:

	Custom Made	PowerSchool	LMS 365	Teams	Alma	Teachmint	Academic Bridge
Development	$55K one time for MVP	0	0	0	0	0	0
Maintainability	500 - 1000$/ Month	0	0	0	0	0	0
Hosting	$4.50 to $200/ Month	0	0	0	0	0	0
Subscription	0	$10000/year	$12000/year	$1k/y	$6000/year	$3000*/year	$500/year

The table below summarizes the functional, and non-functional requirements and the price for each of the solutions:

	Functional Requirements	Non functional Requirements	Total Cost
Teams	6/18	100%	$1000/year
LMS 365	6/18	99.8%	$12000/year
Alma	17/18	100%	$6000/year
TeachMint	17/18	100%	$3000*/year
Academic Bridge	11/18	100%	$1500/year
PowerSchool	18/18	100%	$10000/year

Appendix C.

Solution Screenshots