

# Addressing the Issue of Device Management for IT Administrators in Schools

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## ABSTRACT

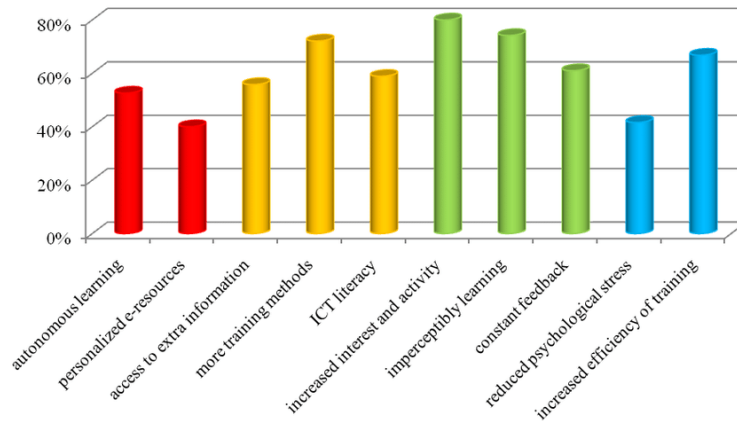
Over the past decade, the incorporation of technology in schools has been increasing rapidly because it has allowed students to learn more effectively, be more engaged, and experience personalized education. However, as the number of school devices increases, it becomes overwhelming for IT administrators to manage thousands of them because they have to manage the devices individually without a proper Mobile Device Management (MDM) solution which should be able to enable IT administrators to remotely control multiple devices at once. Nonetheless, since school IT departments are often one of the least funded with only one to three IT administrators on average and a low budget, they cannot afford proper MDM solutions as they mostly target corporate customers. To fix this issue, Mangopacks is developing a school-focused MDM solution: affordable, easy to use, and powerful with a vision of a future where all schools can use MDM solutions to effectively manage their devices.

## Mangopacks Overview

Over the past decade, the incorporation of technology in schools has been increasing rapidly because it has allowed students to learn more effectively, be more engaged, and experience personalized education. However, as the number of school devices increases, it becomes overwhelming for IT administrators to manage thousands of them because they have to manage the devices individually without a proper Mobile Device Management (MDM) solution which should be able to enable IT administrators to remotely control multiple devices at once. Nonetheless, since school IT departments are often one of the least funded with only one to three IT administrators on average and a low budget, they cannot afford proper MDM solutions as they mostly target corporate customers. To fix this issue, Mangopacks is developing a school-focused MDM solution: affordable, easy to use, and powerful with a vision of a future where all schools can use MDM solutions to effectively manage their devices.

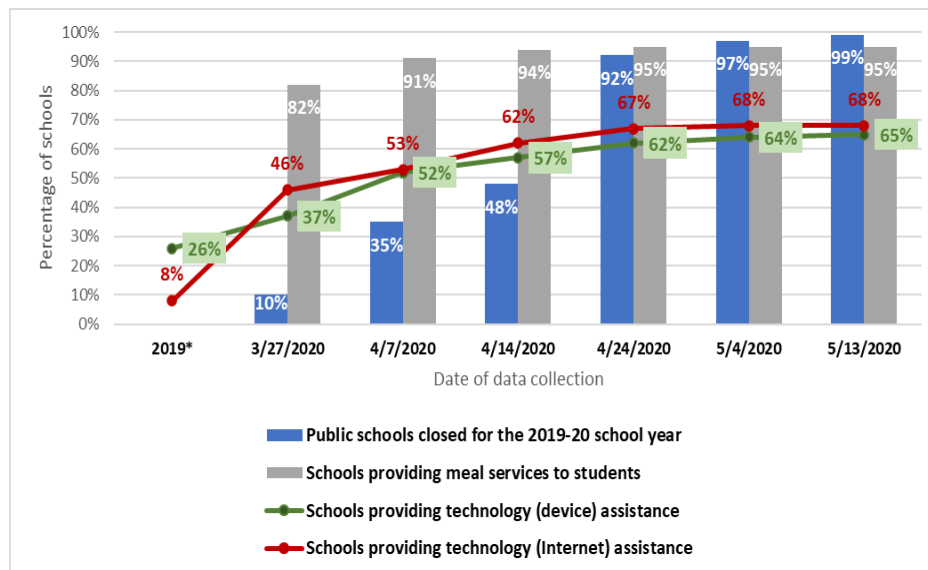
## Increase in The Usage of Technology in Schools

According to the U.S. Department of Education's National Center for Education Statistics, 94% of public schools in America are providing digital devices to their students. Over the past decade, the world experienced a significant increase in the usage of technology in the K-12 education.



One reason why schools are constantly incorporating digital learning solutions is that they help students to learn more effectively. According to a research conducted to measure the effectiveness of technology-enhanced learning for students, students learn with more interest and imperceptibly when learning with technology. Furthermore, as the Educational Technology (Ed-Tech) market and the development of current technology grow, these benefits that students receive from learning with technology are expected to be enhanced. Therefore, the importance of technology in the education system throughout the world is only going to grow in the following years.

Savov, Teodor & Terzieva, Valentina & Todorova, Katia & Kademova-Katzarova, Petia. (2017). CONTEMPORARY TECHNOLOGY SUPPORT FOR EDUCATION. CBU International Conference Proceedings. 5. 802. 10.12955/cbup.v5.1029.

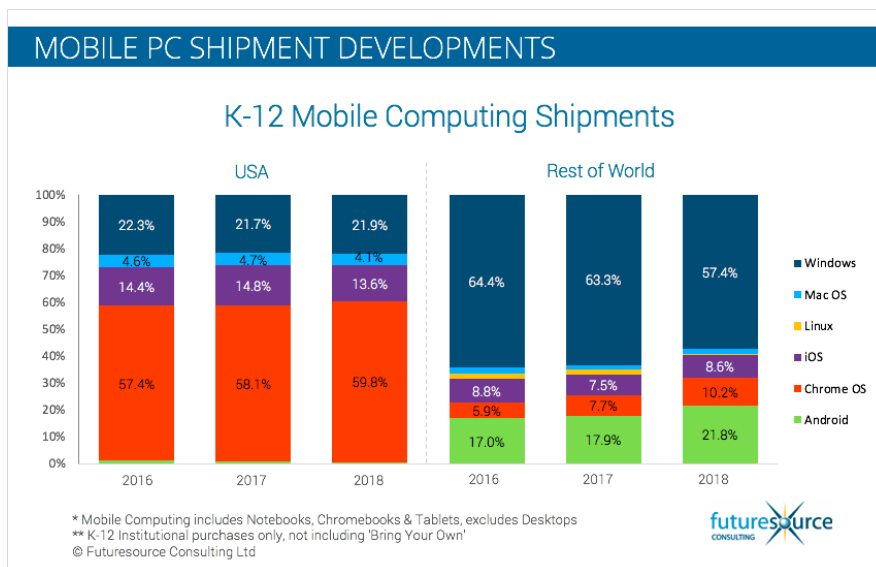
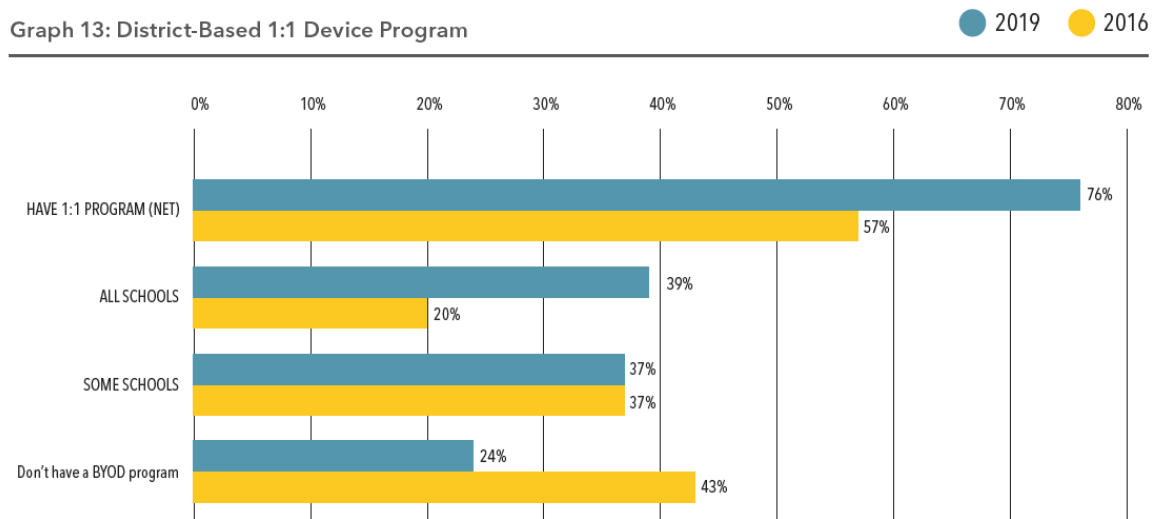


Another reason why schools became dependent on technology for teaching their students is the repercussions of the world-wide COVID-19, as it forced most schools to switch to online classes and provide school devices to students. According to the National School Boards Association, there was an increase of nearly 40% of schools' involvement in supporting devices for students during COVID-19. From this, both the students and teachers became familiar with technology-based education, thus making technology a necessity to the present K-12 education system.

Remote Learning versus Refreshing Changes in Public Schools. (2021). <https://nsba.org/Perspectives/2020/remote-learning-versus-refreshing-changes>

## Devices in Schools

Graph 13: District-Based 1:1 Device Program



As more schools began to require devices like laptops in schools, both the number of schools that provide school devices and schools that allow students to bring in their own devices to school increased. The survey results from K-12 school district administrators above show that by 2019, nearly 80% of the school districts provided a 1:1 device program and nearly 75% of the school districts had a Bring Your Own Device (BYOD) program, suggesting that there are more diverse types of devices used in schools. From this diversity, schools are structured in a mixed-platform environment where the students' devices operate on different platforms and operating systems like Windows, Mac OS, and Chrome OS as the K-12 mobile computing shipment distribution displays.

Mouhanna, A. (2019, December 4). The 2019 K-12 Digital Content Report: What devices are students using? (Part 3) - OverDrive. OverDrive. <https://company.overdrive.com/2019/12/04/the-2019-k-12-digital-content-report-what-devices-are-students-using-part-3/>

U.S. K-12 Market for Mobile Devices Remains Flat; Only 2 Percent Growth in 2018 - Market Brief. (2019, March 21). Market Brief. <https://marketbrief.edweek.org/marketplace-k-12/u-s-k-12-market-mobile-devices-remains-flat-2-percent-growth-2018/>

However, the more complex and technology-oriented schools become, the more the IT administrators suffer with the amount of workload they face on a daily basis like reimaging laptops, deploying apps, and maintaining hardware. If the IT administrators focus on these tedious tasks that often even require physical labor, they will not be able to spend time on securing the school from ransomware and cyberattacks. In fact, IT administrators have reported that 80% of lower education providers and 79% of higher education providers reported that they were hit by ransomware in 2023, which demonstrates that schools need a proper solution to protect and manage their students' devices.

The State of Ransomware in Education 2023 Findings from an independent, vendor-agnostic survey of 3,000 leaders responsible for IT/cybersecurity across 14 countries, including 400 from the education. (n.d.). <https://assets.sophos.com/X24WTUEQ/at/j74v496cfwh4qsvqhs4pmw/sophos-state-of-ransomware-education-2023-wp.pdf>

To avoid these problems, schools need a strong IT Department that can manage the school devices simply and efficiently. However, schools face challenges in finding the proper device management solutions for schools due to the following criteria: price, difficulty, and cross-platform.

## Current MDM Market

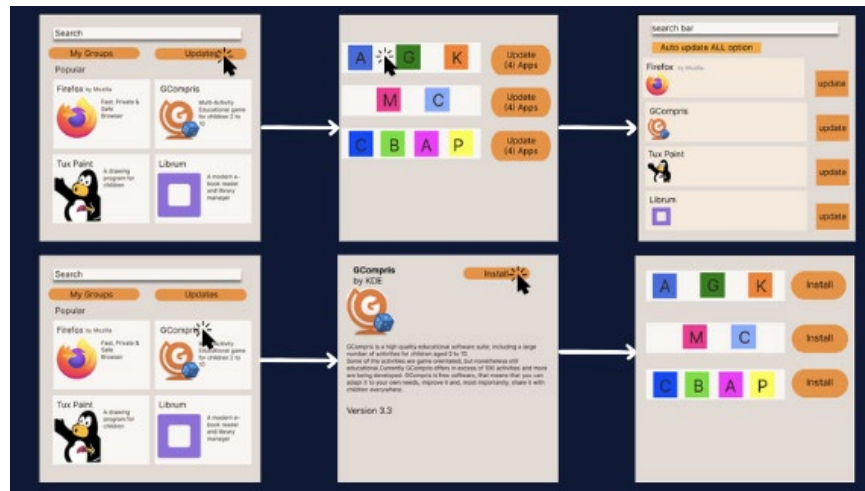
The current mobile device management (MDM) market primarily targets large corporations, often overlooking the unique needs of educational institutions. These corporations typically have the financial capacity to standardize on a single operating system, like Windows or Mac OS, leading many MDM providers to specialize in just one platform. Major players such as Jamf, Kandji, and Google Admin support only a single operating system, leaving schools, which usually have a mixed-OS environment, with limited options.

This gap in the market presents a significant challenge for schools, which often operate with constrained budgets and cannot afford the high costs associated with cross-platform MDM solutions. For example, a solution like Scalefusion, which does support multiple platforms, would cost an average American school with over 4000 devices around \$240,000 annually—not feasible for any school.

Mangopacks enters the market as a cost-effective, cross-platform solution tailored for schools. Unlike competitors, Mangopacks is affordable and offers essential device management capabilities. In addition, the perspective our team has as students and the direct relationships we have with IT admins place us strong in the market for targeting schools.

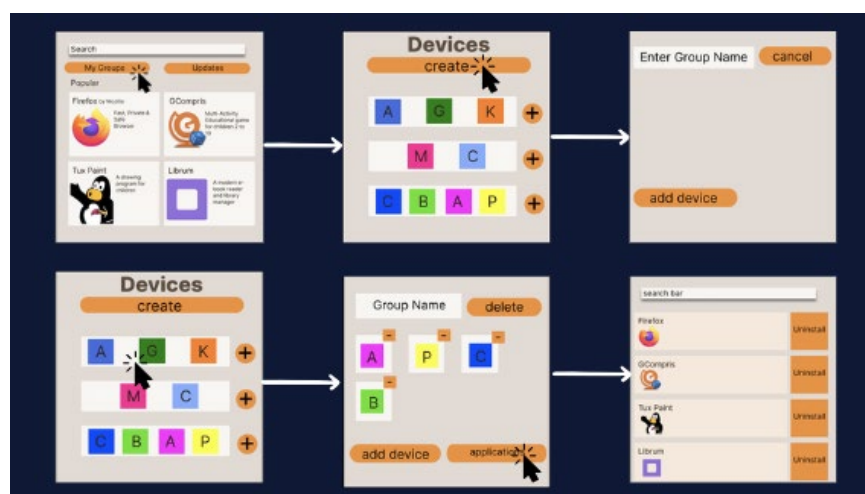
## Products of Mangopacks

Throughout the past few months, Mangopacks have been able to design and develop several Figma representations of Mangopacks. Two separate Figma presentations were developed with one presenting the functionality of the program and the second showing the blueprint of what Mangopacks would look like if it were to officially be developed and released. The first Figma pages show the technicalities of the program and the capabilities of the program. The second part focuses on the visual aspects of the program and making the app as presentable as possible. Furthermore, the Mangopacks team plans on implementing various other features into the software that is not included in the Figma presentations such as cross platform abilities.



**Figure 5.** Figma Model 1 of Technical Capability of Mangopacks

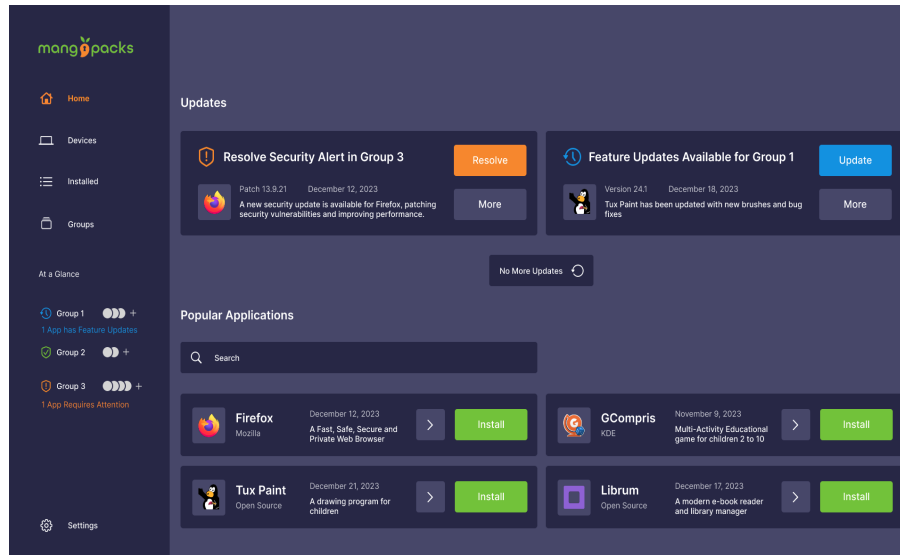
First the functionality of Mangopacks can be discussed with the use of Figures five and six. The home screen consists of various buttons including ones that lead the user to groups, current updates, and available apps for download. This was to allow new users to easily learn and adapt to the new IT application, Mangopacks. By clicking the Updates button, users are taken to a separate page where the pre-existing groups are shown. These pre-existing groups can have several devices and applications downloaded on each device. From there users are able to see the number of various applications that require updates for each group. The administrator has the ability to update all apps needed for a certain group in just one click. The administrator also has the ability to update each app individually if he/she does not want to update all apps. Furthermore, as seen on the bottom 3 slides of figure 5, by clicking one of the popular applications, the user is given further information about the specific app such as the version, app description, and the creator. Users have the ability to install the application through the press of one button where the user can then choose which group he/she wants the application to be installed on.



**Figure 6.** Figma Model 2 of Technical Capability of Mangopacks

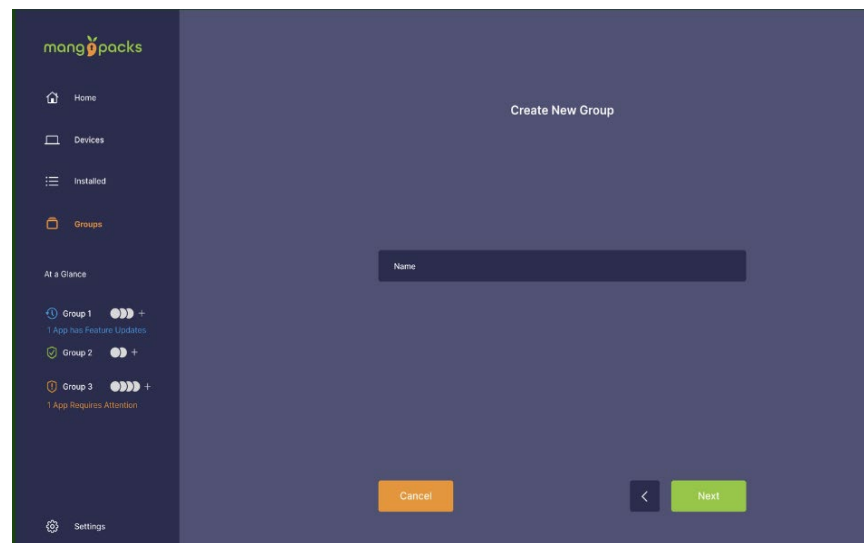
Furthermore, Mangopacks offers a Devices page where users are able to create and edit existing groups.

Through clicking the “create” button in the My Devices home page, users are able to name the new group and add devices into it. By clicking on a pre-existing group, users are able to remove and add certain devices. They are also able to identify what specific applications are installed for the devices in the group and have the ability to uninstall the apps.



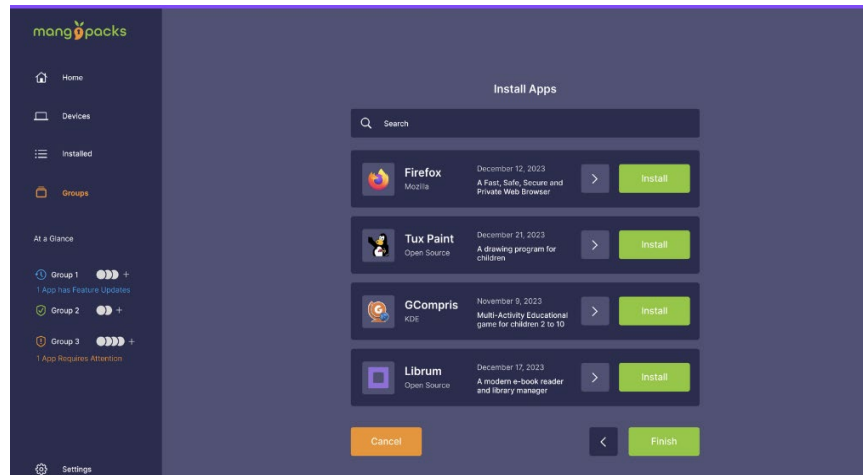
**Figure 7.** Figma Model 1 of Visuality Design of Mangopacks

Finally, the final visual design of Mangopacks. The final product of Mangopacks has been designed with cleanliness, organization, user friendliness also taken into consideration. As you can see, it has significantly improved visuals and organization of certain functions of the program such as available apps for download. It has been designed to make everything easily accessible and user friendly. Mangopacks aims to fully adapt the final design of the application if it were to become an official website and application.



**Figure 8.** Figma Model 2 of Visuality Design of Mangopacks

Furthermore, the final design of the Mangopacks app have utilized color coordination to allow easier use of the application. With various colors such as orange, green, and blue, which aim to match the brand colors, signify specific actions and purposes.



**Figure 9.** Figma Model 3 of Visuality Design of Mangopacks

Here we have the Apps page where IT Administrators can install applications of their choosings to certain groups within their domain. As seen Firefox, Tux paint, GCompris, and Librium are just some of the applications available. As seen, compared to the previous design, the Install Apps page is designed to be much more visually appealing and user friendly.

Although not mentioned or found on the Figma representations of Mangopacks, our team is working on developing a device tracking system which eases the problem of finding and retrieving lost and/or stolen devices. This technicality is still in the development stages but our team hopes to implement it when it becomes available.

## Challenges Faced During Development

This application, however, also consists of limitations. While we aim to be a tool that supports devices of many platforms, it will, ultimately, be limited because we cannot ensure a working system that unites every platform that is available to use. Every platform has different requirements that will be difficult for IT administrators to manage, because there are many of them. However, the primary ones that are mainly used in school environments will be incorporated into Mangopacks. Some programs that are not open-sourced –meaning source code not available to the public– might be inaccessible for Mangopacks. For example, softwares like Skype and Adobe are not open-sourced, meaning they might have to be managed platform-specifically. We have to find a way to offer the application without using the source code to provide the users; however, with more research and experience, we can make this process easier for IT admins.

One other limitation we might face is the data privacy for students using their personal devices in schools. Since the Bring Your Own Device (BYOD) programs are prevalent in nearly 70% of schools, our product would not be as helpful to the IT administrators as we would want it to be if we cannot manage all the



devices that are used in school, including the student's personal devices. However, we can overcome this limitation by restricting Mangopacks' capabilities within the school network. This will allow students to keep their devices secured and effective in school for educational purposes, but maintain their privacy outside of school.

## Going Forward for Mangopacks

The possibilities in aiding IT administrations at schools are endless. However, with existing time constraints and complex backend, there are many things that are on the list for future possibilities. While we aim to support many different platforms when it comes to working softwares, it is a complex process to provide much native backend. Some applications tend to be platform-specific, meaning that each package will be different according to the device type. Installing or managing applications natively will be difficult without an interpreter, which is not directly implemented into our first model of MangoPacks. However, it is a future possibility that is one of our goals to include into MangoPacks.

Additionally, we were able to get feedback from Mr. Peter, an IT manager from Nueva K-12 School. After our presentation, he informed us that another feature he looks forward to is the device tracker. Because so many devices are being managed at schools, it is crucial for administrators to have a way to identify and locate each of them. Therefore, MangoPacks plans to add the device tracking system into the devices that use MangoPacks to further make IT administrators' work more efficient.

Mentor and first-customer Mr. Jonathan, who is an IT manager at LACS, also provided us with advice when we visited him at his school. Because softwares is somewhat limited in many ways, a scripting engine was something mentioned. IT managers would have the ability to create their own packages and procedures and download software onto devices; they can take part in the package development. Easy-to-follow directions will guide staff to create their own features, opening up endless possibilities for IT managers. Not only do we plan to implement software management, but more security. When groups of devices have the same configuration, it allows the IT manager to control certain security features for the applications that the students would be using.

Mangopacks' market strategy lies in leveraging the connections our members and mentors have with schools in need of the tool. With our currently initiated pilot partnership, Los Altos Christian Schools, a testing ground for Mangopacks was provided. Beyond this, we'll start focusing our direct sales to IT departments in California by utilizing such connections. We plan extensive marketing campaigns for schools, participating in tech conferences, competitor analysis, partnering with close customers, and seeking stakeholder input. Furthermore, more work will go into maintaining our website and public image. We will keep revising using feedback loops to prevent major issues of Mangopacks. Our resources will also provide a way to protect our project's features and brand through legal fees, reviews, editing, and related expenses.

## Acknowledgments

I would like to thank my advisor for the valuable insight provided to me on this topic.

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