A Capstone Project

Entitled

The Car-line Shuffle: A Sustainable Approach to School Transportation

By

Marc Steelman

We hereby certify that this Capstone Project submitted by Marc Steelman conforms to acceptable standards, and as such is fully adequate in scope and quality. It is therefore approved as the fulfillment of the Capstone Project requirement for the degree of Bachelors of Applied Science in *Sustainability Management*.

<u>Approval:</u>

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Table of Contents

I. Executive Summary

Schools are integral parts of the communities that they serve. Every school's systems and processes impact their communities both directly and indirectly. While the impact is overwhelmingly positive, such as the enrichment of young minds, their choices do sometimes carry unintended consequences, such as air pollution relating to transportation choices. Making small improvements to areas such as transportation can have a big impact on the overall sustainability of the organization.

Choosing to make those small improvements today can make a better tomorrow. The following report details a sustainability-related improvement project intended to create change at Gulf Beaches Elementary Magnet School (GBEMS). Recommendations to improve GBEMS's car-line dismissal process were developed using several applicable theories of sustainability, and established industry best practices.

There are several key individuals that were involved with this project. The school's Principal acted as the primary point-of-contact at GBEMS, and an executive with an existing web-based student dismissal application was also involved. Some parents who use the car-line, and several GBEMS staff members that are directly involved with the current dismissal process, provided information during the process audit.

Improving the school's environmental impact and saving time and money is very important. While several options exist to meet the project's improvement goals, the audit revealed that the most viable improvement option is for GBEMS to adopt a web-based student dismissal service to make the car-line dismissal process as efficient and effective as possible. Key costs and benefits are included in the summary table below.

Table 1. Cost and Benefits of Web-based Dismissal Service. (Adapted from MindTools, n.d.)

Summary of Costs and Benefits of Web-based Dismissal at GBEMS	
Benefits	**Costs**
• Reduced local traffic congestion • Improved student safety • Reduced car-line dismissal time • Reduced vehicle emissions (300-500lbs. CO2 reduced per week) • Greater accountability • Fuel savings over $2,000 each year • Requires fewer dismissal staff • TBARTA grant available for first-year fees	• Fees for contracted company after first year (based on number of students) Approx. $2,900 • Needs buy-in from parents and school personnel • Training associated with learning system • Users require equipment with internet capability (i.e. smart-phone or tablet)

Information from the summary chart indicates that GBEMS can improve their current process by adopting a web-based dismissal service. Although there are fees for service, potential financial solutions include possible grant extensions or PTA-sourced funding.

Significant improvements can be realized by automating GBEMS's dismissal process, including decreasing its overall environmental impact and lessening the disruptions to the surrounding community. The automation of the process may also provide future opportunities. By identify similar routes taken by parents, car-pooling suggestions could be made and possibly incentivized. The system could also later be improved to include a feature that gives an approximate best time for parents to pick-up their child. Finally, the school can use this sustainability project as a learning opportunity and a catalyst to create a school-wide improvement plan that involves input from the students. Creating a better understanding of our environmental impact at an early age may be the most important outcome of this project. Let's make a change with the future, for the future!

II. Introduction

Schools are indeed key members of their respective communities. Involving the members of the community, or even considering and addressing the impact that the school's policies and practices may have on them, is crucial in maintaining a good, functional relationship. An article published by the National Education Association (NEA) includes research indicating organizations that encourage parent, family, and *community* involvement in the decision-making processes realize improved community support, increased student achievement, and overall school improvement (n.d.). This project involves Gulf Beaches Elementary Magnet School (GBEMS), and in part, addresses how they can lessen the impact that their policies and practices have on the surrounding community, the environment, and other stakeholders. The intent of this chapter is to provide a review of the background, highlight key sustainability issues and theories, and provide an overview of potential compliance issues for the organization related to this project.

Figure 1. School Image. (Photo credited to author)

Company background. GBEMS is a kindergarten through fifth grade elementary

magnet school located in Pinellas County, Florida. GBEMS opened in 2014 as one of the

Pinellas County School District's Centers of Innovation and Digital Learning (Pinellas County

Schools, n.d.). The school has a faculty and staff of 41 and a student body of more than 300

(Gulf Beaches Elementary Magnet School, n.d.). GBEMS states "(t)he mission of Gulf Beaches

Elementary Magnet School is to educate and prepare each student for college, career, and life"

(n.d.). The school's relatively small size provides the opportunity for close interaction with

administrators and favorable student-to-teacher ratios. The current organizational climate among

faculty and staff will be helpful in facilitating any necessary changes.

Industry trends in education are moving towards developing more sustainable organizations (Green Strides, n.d.). One example of an industry trend in education is increased school-choice options and participation (Urban Institute, 2017). Although school-choice has been supported throughout the country, little attention has been given to the issue of student transportation to and from those schools (2017). Considering transportation options that have minimal impact on stakeholders will be key in supporting any proposed sustainability-related changes.

Sustainability Issues and Theories

Issues. Human beings greatly influence, and are influenced by, their surroundings, or environment. Actions often have unknown or undesired consequences relating to those surroundings. For example, available transportation options often involve burning gasoline for energy. Gasoline is a liquid petroleum refined from fossil fuels (Ristinen & Kraushaar, 2006). Being derived from a nonrenewable source, meaning it is finite, is one issue with using gasoline for energy (2006). Another issue is that burning gasoline in an internal combustion engine contributes directly to *air pollution* through the emission of Carbon Monoxide (CO) (2006). Other vehicle emissions that contribute to air pollution include nitrogen oxides and volatile organic compounds (VOCs) (2006). These air pollutants can relate to short and long-term health problems.

Air pollution related to our transportation choices is justifiably a cause for concern. Areas with high levels of vehicle traffic can have increased levels of CO, which poses a risk to human health in the immediate area (Manahan, 2011). CO is toxic to humans because it decreases the oxygen-carrying capacity of blood, which can lead to hypoxia and death (Occupational Safety and Health Administration, 2002). Air pollution from vehicle emissions in the Earth's atmosphere also impacts the climate, or weather conditions over a long period of time (Manahan, 2011). However, air pollution and climate change are not the only issues surrounding our transportation choices. More vehicles on the roadway can create traffic congestion and potentially disrupt or decrease the quality of life in affected communities. These disruptions include potentially decreasing response times from emergency personnel in situations where every second counts (Morgan, n.d.).

Theories. There are many available theories that relate to sustainability. One key theory of sustainability suggests that we maintain the Earth's environment while supporting our desired level of activity and progress (Manahan, 2011). This theory of sustainability was defined in a United Nations' World Commission on Environment and Development report in 1987 (2011). The Brundtland Report, as it became known (referencing the report's author Gro Harlem Brundtland), defines sustainable development as "industrial progress that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 2). The report also recognizes that "many of us live beyond the world's ecological means" and "that sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all" (Brundtland, 1987 p.42). Brundtland's

theory applies to this project directly as the goal is to meet the school's needs in a manner that does not compromise the needs of others.
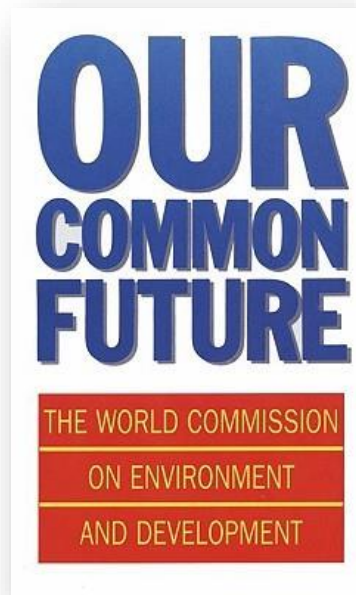

Figure 2. Our Common Future. (Image from Manahan, 2011)

Another theory that applies to this project is the Triple Bottom Line (TBL). Aside from the tradition bottom line that accounts only for profits, the TBL makes an organization consider the social, environmental, and economic impact that they have (MindTools, n.d.). The graphic below depicts the Three P's (people, planet, and profit) of the TBL. While the TBL is primarily a reporting system, an organization can consider what impact its practices have on the Three P's to become a more sustainable and socially responsible organization (n.d.).
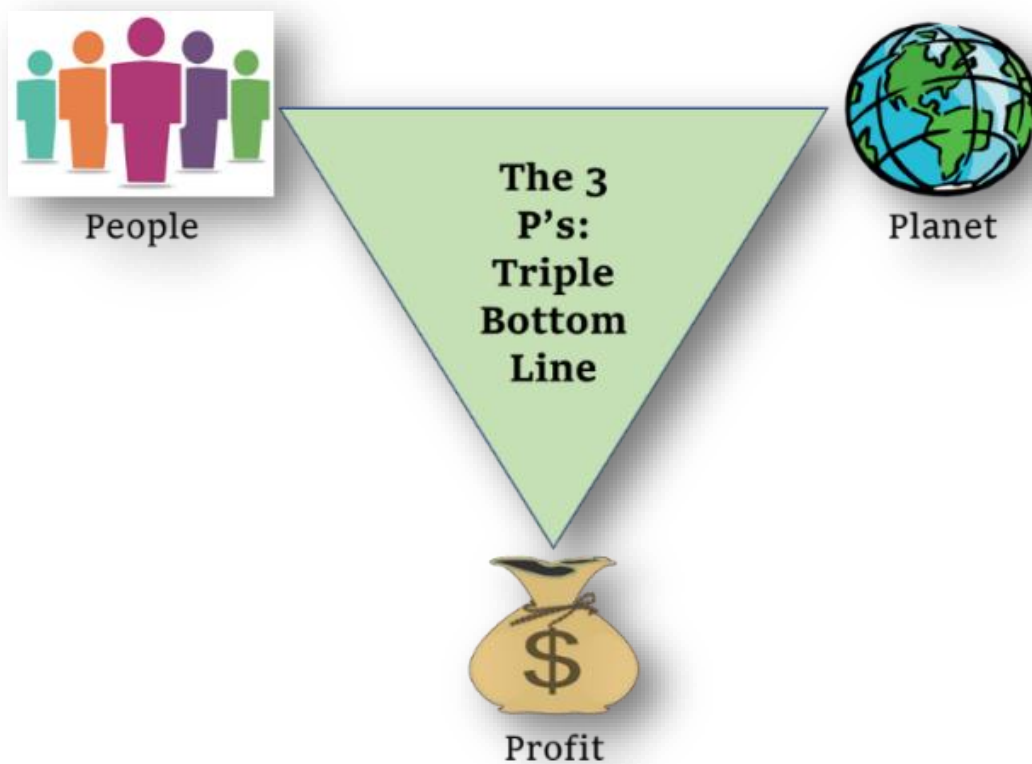
Figure 3. The Three P's. (Adapted from Ivkovich, n.d.)

Finally, The Natural Step theory applies four basic rules to define sustainable change (The Natural Step, n.d.). The Natural Step's sustainable principles argue that "in a sustainable society, nature is not subject to systematically increasing concentrations of substances removed from the earth's crust, increasing concentrations of substances produced by society, or increased degradation by physical means." (n.d.). It continues, "and in that society, there are no structural obstacles to people's health, influence, competence, impartiality and meaning." (n.d.).
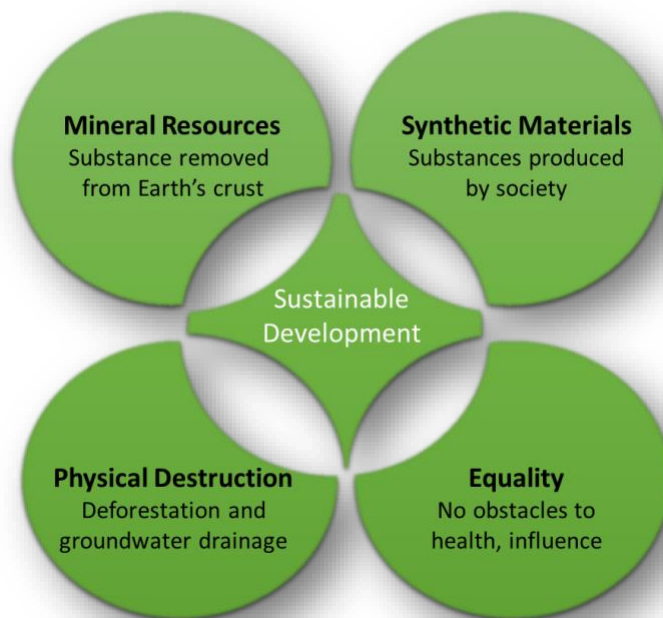
Figure 4. The Natural Step Model. (Adapted from The Natural Step, n.d.)

The model of The Natural Step depicts how its four basic rules interconnect to promote

sustainable development. The Natural Step theory can be applied directly to this project by

addressing resource use and air pollution issues. Equality in the model can relate to considering

all stakeholders with the same regard, including the surrounding community.

Compliance

Background. There are specific rules and recommendations that provide guidance to

organizations relating to their operation. In general, compliance with rules and recommendations

can be voluntary (on own accord), or required by law (statutory & regulatory) where failure to

comply may result in being assessed a penalty or monetary fine (Seshadri, 2015). Several

governing bodies enforce existing regulations that schools must comply with. Often, one

regulatory body will develop recommendations for other governing bodies to enforce.

For example, the Environmental Protection Agency (EPA) recognizes that idling vehicles are a direct source of air pollution (EPA, n.d.). Individual states then develop regulations based on EPA guidance and recommendations relating to air pollution. The Environmental Law Institute (ELI) provides an overview of multiple states' (including Florida) restrictions on idling vehicles near student bodies that are based on EPA recommendations (2015). In Florida, regulatory compliance is deferred to the local school board, where policies that reflect the state's and EPA's recommendations are required (2015).

Another example of developing regulations based on guidance from a national organization is the Centers for Disease Control and Prevention (CDC) recommendations relating to Carbon Monoxide (CO). Specifically, the CDC provides research information and recommendations related to Carbon Monoxide (CO) poisoning. Individual states then develop regulations that restrict activities producing CO, or require CO monitoring to be in place (Environmental Law Institute, 2015).

Voluntary compliance. As mentioned, there are voluntary compliance programs that schools and organizations are not legally required to fulfill. Some of these voluntary compliance models and programs are developed by the same bodies that create regulations. An example is the EPA's School Environmental Health program. "A school environmental health program is a holistic, comprehensive, and actionable strategy that integrates preventive measures and addresses environmental health issues by fostering well-maintained school buildings and grounds." ("What is a School Environmental Heath Program", n.d.). The School Environmental Health Program is a model, or framework, that organizations can chose to apply that is effective at promoting health and safety in schools (n.d.).

The U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) also provides a rating system specifically for schools. "LEED for Schools provides a unique, comprehensive tool for schools that wish to build green and achieve measurable results" (USGBC, n.d.). Compliance with LEED for Schools is voluntary and applies to new construction, major renovations, and operations and maintenance of existing buildings (n.d.). Achieving any level of LEED certification indicates a strong commitment to sustainability by the organization.

Conclusion. The intent of this chapter was to provide an overview of the project organization's background, key sustainability issues, and regulatory compliance. This chapter provides information that will be used in later chapters, including Chapter 6, when determining future recommendations.

III. Stakeholders

       The intent of the following chapter is to identify the stakeholders related to this

project. Identifying and understanding stakeholders that may be impacted by a project is a key

step that will influence the direction and outcome of the project. There are multiple theories and

models available to assist in identifying and understanding key relationships among stakeholders.

This project, in part, uses the Corporate Sustainability Model (Epstein & Buhovac, 2014) to

manage drivers and identify stakeholders that impact sustainability within the organization. The

Corporate Sustainability Model (2014) provides "a sustainability framework or model of social,

environmental, and economic performance" that "creates enduring value for multiple

stakeholders" (p. 9). This model was selected based on the understanding that the project will

impact multiple stakeholders including: school staff, parents/caregivers, students, and

community members, to name a few. A graphical model of the project's stakeholders was used

to identify and briefly describe the roles of each, followed by a more thorough stakeholder

analysis. Primary stakeholders (those with greater influence on the process) and secondary

stakeholders are indicated by color in the stakeholder model, red and blue respectively. Finally,

information describing key points from a brief stakeholder meeting is included at the end of this
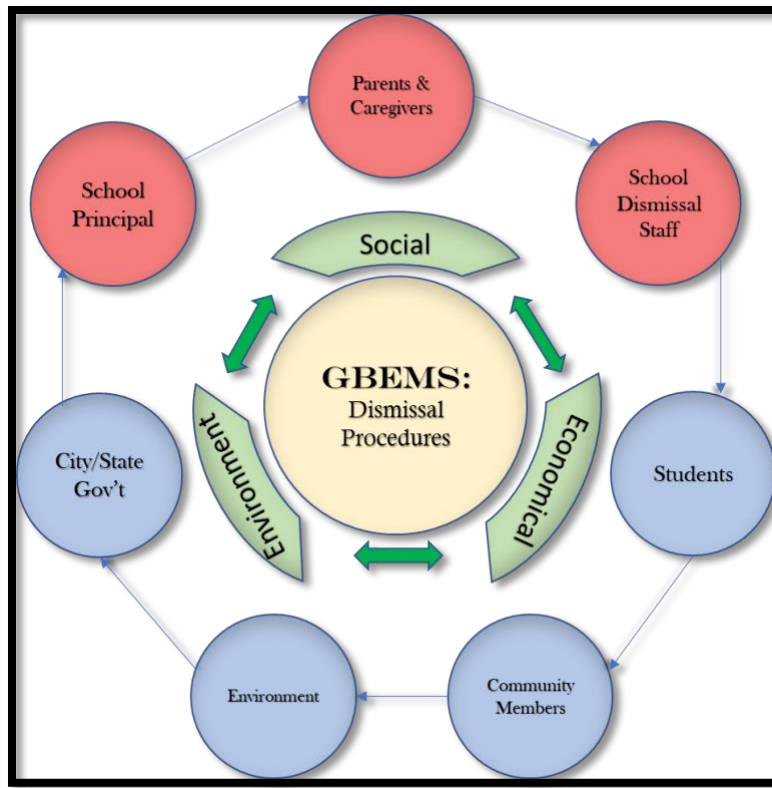
section.

Figure 5: Stakeholder Model. (Adapted from Dam et. al, 2018)

Stakeholder Model Description

- **School Principal**. The role of the principal for this project includes determining and facilitating dismissal times and procedures. The principal is also in charge of monitoring student dismissal activities and, currently, actively participates in the dismissal process. All project decisions made will require the principal's permission.

- **School Dismissal Staff.** Select school staff members (primarily teachers) are tasked with facilitating the dismissal process, including directing the appropriate students to the assigned dismissal location (e.g. walkers to the walk-up gate). The task is distributed to teachers by grade, on a rotating basis. The project proposals may impact the dismissal staffs' assigned duties and will need their buy-in to facilitate change.

- **Students.** The students are directly involved in the process, as they are the ones that are dismissed to the appropriate location based on the parents' requests (i.e. car-line, walker, after-care program, etc.). The students' safety is paramount in this process, and any changes to the current process will likely impact the student body.

- **Parents & Caregivers.** The role of the parents and caregivers include being responsible for following school guidelines for student pick-up. The parents' current options include a walk-up gate, vehicle pick-up (car line), and after-care pick-up (city recreation center). The school is notified of, and records, the parents' or caregivers' request and issues guidelines for the selected process (e.g. vehicle queue location, walk-up gate location, etc.).

- **Community Members.** Members of the community were included in the stakeholder model because of the direct impact that the school's current dismissal process has on some. Vehicles are staged, single-file, down a residential street (Boca Ciega Drive) which includes many private homes with connecting driveways, neighborhood parks, and a church. The community members are impacted by having their driveways frequently blocked, disrupted parcel delivery, and decreased air quality from the idling vehicles.

- **Environment.** The inclusion of the environment as a stakeholder in this project is primarily related to vehicles idling in the car line that is currently established for student pick-up. The idling vehicles increase the emission of greenhouse gasses (GHGs), decrease the air quality in the immediate surroundings (a residential neighborhood), and waste nonrenewable resources.

- **City & State Governments.** The current dismissal processes impact both state and city roadways. The school is bordered on three sides by city roads, and a city road currently acts as the staging area for parents and caregivers waiting to pick-up the students. A state road (SR 699, or Blind Pass Road) borders the school's property and is not currently designated a school zone with a 15 mile per hour speed restriction.

Table 2. Stakeholder Position Analysis. (Adapted from Bryson, 2004)

Stakeholder Name	Current Position	Reasons for Current Position	Needed Position	Action Plan or Mitigation Strategy
Principal	Support	• Determines policy • Actively participates	Support	• Maintain support • Seek input
Dismiss Staff	Neutral	• Following policy • Currently little input	Support	• Seek staff input/requests • Consider additional staff needs
Students	Support	• Willing to comply to rules • Support parent's wishes	Support	• Consider all student's needs • Create excitement for change
Governments	Neutral	• No input in process • Ensure local laws are followed	Neutral	• Maintain current relationship • Update with any changes
Environment	Neutral	• GHG emissions • Not considered in current policy	Neutral	• Reduce GHG emissions • Include impact in policy making decisions
Community	Neutral	• Disrupted way of life • Needs not considered in current process	Support	• Seek input • Reduce potential impact on surrounding community
Parents	Neutral	• Not satisfied with current process • No input in current process	Support	• Seek input on necessary changes • Make process accommodating to all

The stakeholder model and stakeholder position analysis provide graphical representations of those that will impact, or be impacted by, the project. The position analysis represents the identified stakeholder's position (support, neutral, resist) relating to the current process and where their position is required to make positive change in the process. Key areas identified in the position analysis include the need to shift the positions of the dismissal staff, the parents and caregivers, and the community from neutral positions, to positions of support. Also, the environmental impact of the student pick-up process needs to be considered and *reduced* with future policies. Suggested actions include seeking input from all primary stakeholders, and making changes that take the environment into account.

Stakeholder Meeting Description

A brief, informal meeting with a primary stakeholder (the GBEMS principal) discussed the scope and intent of the project. The stakeholder identified a need that fell within the guidelines of the project. Currently, there are three options for student pick-up and one of the options is vehicle pick-up. The stakeholder expressed a desire to make the dismissal process "more environmentally friendly" and recognized the need to reduce the school's impact on the surrounding community. The stakeholder advised that there will be no available funding for any changes that does not come directly from the school district. The stakeholder stated support for the project and committed to assist in facilitating any necessary change that can be reasonably achieved. Future input from other key stakeholders (parents) at upcoming meetings (PTA) may provide valuable project feedback. This stakeholder information is essential to the project success and will be useful later when making recommendations that ensure the needs of all stakeholders are addressed.

IV. Comprehensive Audit

The purpose of this chapter is to define and display information gathered while conducting a sustainability transportation audit at Gulf Beaches Elementary Magnet School (GBEMS). The audited process, the school's student dismissal activities, involves individual student pick-up by their parent or care-giver. As observed directly by the author, most student pick-ups involve the use of private vehicles. The United States Environmental Protection Agency (EPA) lists 33 air toxins, or hazardous air pollutants (HAPs), identified as detrimental to human health, with 13 of the 33 HAPs being directly related to vehicle emissions (United States Environmental Protection Agency, n.d.). Vehicle emissions associated with excessive idling can expose students and staff to increased levels of HAPs (n.d.). With a start time of 8:35 a.m. and end time of 2:35 p.m., GBEMS' students spend at least six hours, five days a week, in school (Gulf Beaches Elementary Magnet School, n.d.). Considering that students spend a significant portion of their day at school, addressing air quality should be a priority.

To generate the data used in the transportation audit, the current school dismissal process was observed directly and recorded using a check sheet system. A check sheet is a data collection method that is used when repeated, direct observations can be made of a process either by the same individual, or in the same location (Kollengode, 2010). The check sheet is a useful tool for collecting, displaying, and analyzing quantitative data, and is one of the Seven Basic Tools of Quality used in process improvement management methods such as Lean and Six Sigma (What Is Six Sigma, n.d.). The principal at GBEMS indicated that the volume of vehicles participating in the dismissal process varies each day of the week, based on multiple after-school activities offered. Information gathered during the audit includes the number of vehicles queued

in the car line, number of vehicles parked or idling on the roadway easement for student pick-up at the "walk-up gate", and vehicles parked in an adjacent lot to use the walk-up gate. The pick-up process averaged 30 minutes to complete. The table below represents the check sheet used.

Table 3. GBEMS Dismissal Vehicle Tally. (Adapted from What is Six Sigma, n.d.)

Vehicle Tally					
Day of Week	Mon.	Tue.	Wed.	Thur.	Fri.
Car Line					
Easement Parking/Idle					
Adjacent Lot Parking					

The check sheet indicates a fluctuation in volume related to vehicle pick-up throughout the week. Friday and Monday are the days with the heaviest volume overall. Thursdays had the lowest amount of vehicle traffic as there are multiple voluntary after-school programs. Additionally, a column chart was created displaying the transportation audit results to better illustrate the distribution of vehicles during pick-up. Column charts are effective, simple presentations with colored columns that are intended to enable visual comparison of the data (Lynch, n.d.)

GBEMS PICK-UP VEHICLE DISTRIBUTION

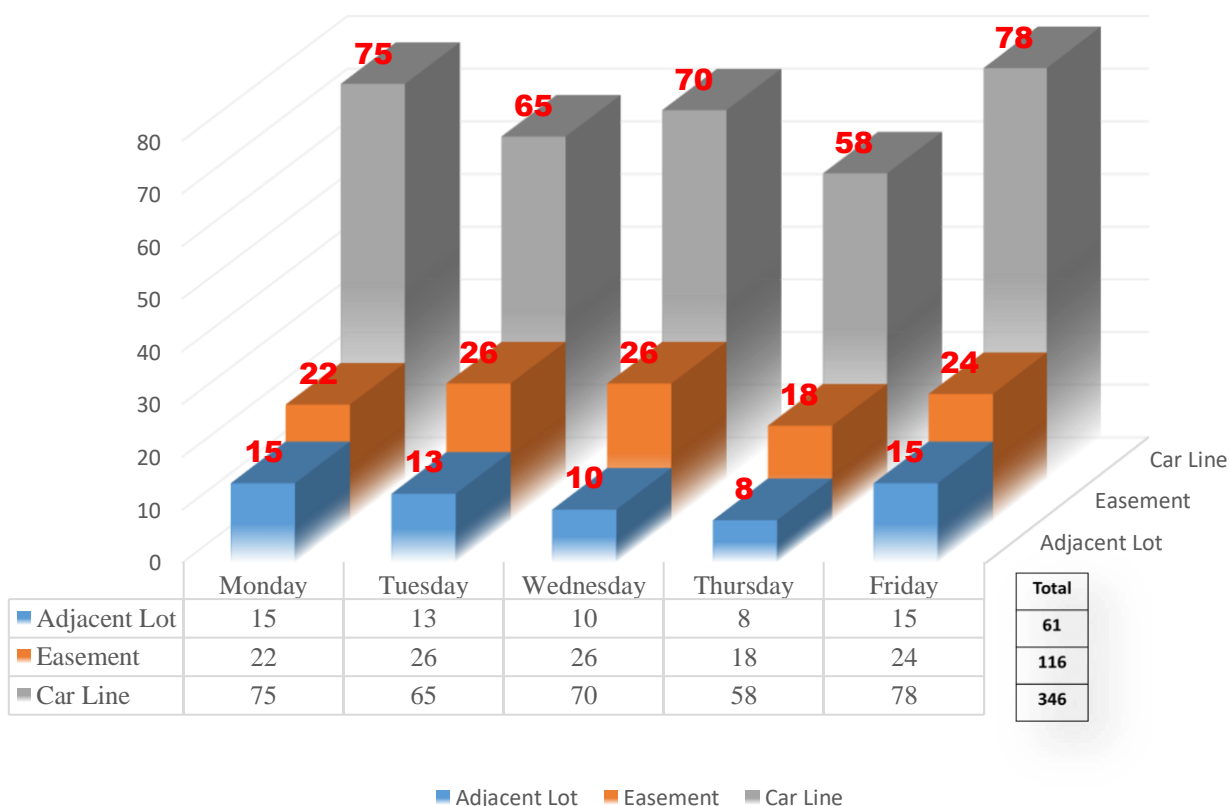|	Monday	Tuesday	Wednesday	Thursday	Friday	Total
■ Adjacent Lot	15	13	10	8	15	61
■ Easement	22	26	26	18	24	116
■ Car Line	75	65	70	58	78	346

■ Adjacent Lot   ■ Easement   ■ Car Line

Figure 6. Pick-up Vehicle Distribution. (Adapted from Lynch, n.d.)

The above diagram represents the vehicle distribution during GBEMS' dismissal process. During the observed week, the average for the total number of vehicles participating in pick-up was 104.6 vehicles/day. The average car line included 69.2 vehicles/day, the average number of cars parked along the roadway easement was 23.2 vehicles/day, and the average number of vehicles using the adjacent parking lot was 12.2 vehicles/day. The average use of each area for the week is displayed in the pie chart below. A pie chart is helpful when displaying percentages of the total and the proportion of the categories (Verial, 2017).

AVERAGE VEHICLE DISTRIBUTION: WEEK

Adjacent Lot
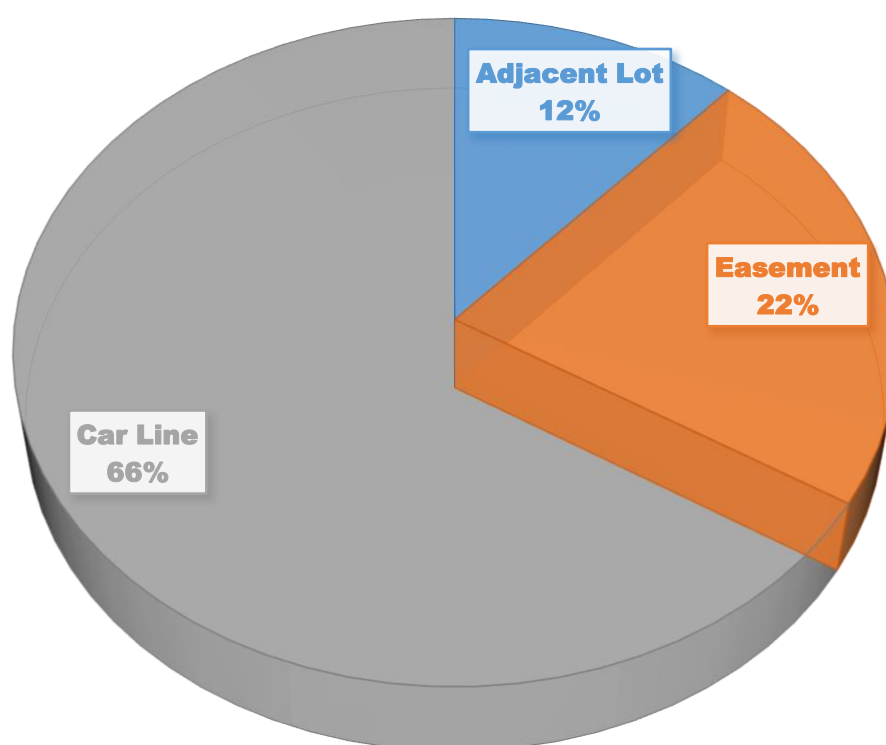12%

Easement
22%

Car Line
66%

Figure 7. Average Vehicle Distribution for Week. (Adapted from Verial, 2017)

The transportation audit indicates that the most used method for student pick-up is the vehicle car line. The easement was used 22% of the time for pick-up, and the adjacent lot 12%. The car line was used by 66% of all the vehicles during pick-up, idling in queue for more than 30 minutes during the observed week. Idling vehicles pose a significant health risk as they expose students and staff to increased levels of HAPs (United States Environmental Protection Agency, n.d.).

Idling vehicles also unnecessarily consume fuel. According to the website Energy.gov, the average passenger vehicle consumes between 0.16 to 0.39 gallons of fuel per hour while idling (Energy.gov, n.d.). For each gallon of gasoline burned, approximately 20 pounds of carbon dioxide (CO_2) is released into the environment (Fueleconomy.gov, n.d.). To determine how much of this greenhouse gas is released by idling vehicles during GBEMS' pick-up, the total number of cars that used the car line was multiplied by the amount of fuel consumed over the length of the process, multiplied by 20 (pounds of CO_2). Again, the process took approximately 30 minutes. The formula appears below.

346 (Car line total) x 0.39 (gallon/hr.)/2 (30 min process) x 20 (lbs. CO2 per gallon)
346 x 0.195 x 20
67.47 x 20 = 1,349.4 lbs. CO2

Next, the total amount of emissions will be evaluated if there was reduction in the length of time for the car line process. The following formula displays the total amount of CO_2 emitted assuming the process was reduced to 20 minutes.

346 x 0.39/3 (assuming 20 min process) x 20
346 x 0.13 x 20
44.98 x 20 = 899.6 lbs. CO2

Each week, the vehicles that use the GBEMS' car line produce and emit about *1,350* pounds of CO_2 into the environment. First, if the number of vehicles that use the car line was reduced by 20%, that would relate to a reduction of almost *300* pounds of CO_2 emitted each week. Reducing the number of vehicles in the car line may also limit the disruptions that are experienced by the surrounding community. Next, if the total process time was reduced to 20 minutes, the amount of CO_2 emitted would be almost *500* pounds less than is currently emitted. The information displayed in this chapter will be used when considering future recommendations in Chapter VI.

V. Best Practices

The purpose of this chapter is to review suggested best practices related to the student dismissal process at schools with limited transportation options. The chapter is divided into sections that will address specific issues and contain best practice recommendations appropriate for each issue. The sections include: issue overview, traffic congestion, air pollution, technological solutions, other cities and industry's practices, and a conclusion. Because Pinellas County School District's policies impact Gulf Beaches Elementary Magnet School's (GBEMS) dismissal process, future best practice recommendations will focus on improving the current situation at GBEMS, while adhering to current district requirements.

Issue Overview

Increased popularity in school choice programs nationwide has resulted in "increasingly complex and expensive" transportation options and has led to certain school districts creating policies that place the onus of transportation on the parents and caregivers of school choice students (Vincent et al., 2014). In Pinellas County, Florida, about 11,000 students apply each year for access to a school outside of their district-zoned option, or school "choice" (Tobin, 2018). School choice provides students and parents access to quality education opportunities, however, transportation to and from their chosen school is largely the parents' responsibility (Pinellas County Schools, n.d.). The Pinellas County School's informational website states "(i)n alignment with School Board policy, regular transportation will only be provided for eligible elementary students attending their zoned school. Arterial service will be provided for countywide programs for eligible students" (n.d.).

Traffic Congestion

  Background. One issue with a district policy that reduces or eliminates school bus services is the influx of traffic congestion created near facilities designated as choice schools. As previously mentioned, increased traffic congestion can disrupt or decrease the quality of life in surrounding communities, as well as potentially decrease response times by emergency personnel (Morgan, n.d.). There are available best practice recommendations that address traffic congestion related to pick-up area at schools that require car lines.

  Recommendations. The Texas Transportation Institute (TTI), in conjunction with the Texas A&M University System, has researched and developed recommended guidelines for traffic operations and safety at schools (Cooner et al., 2004). These guidelines can improve the efficiency of the dismissal process, thereby reducing congestion on impacted roadways. The TTI recommendations include:

- Separate, as much as possible, the physical routes for the different modes of dismissal (i.e. walk-up gate and car line gate).
- All roadways, except loading zones, should be designated No Parking or No Standing.
- Plan and accommodate emergency vehicle access.
- Utilize all potential pick-up/drop-off zones.
- Parent loading should occur in designated zones to minimize pedestrian/vehicle conflicts (2004).

Air Pollution

      Background. Another issue with district policies that put more vehicles on the road is the increased air pollution associated with idling vehicles. As recognized by the Clean Air Act, idling vehicles are a direct source of hazardous air pollutants (HAPs) (EPA, n.d.). These HAPs are being emitted in very close proximity to students and staff at GBEMS. Currently, there are best practice recommendations available that may make the necessary car lines more efficient and decrease the amount of HAPs emitted near schools, including GBEMS.

      Recommendations. Clean Air Carolina, a not-for-profit dedicated to improving North Carolina's air quality, has developed best practice guidelines for school car lines (Picarsic, n.d.). According to Picarsic and Clean Air Carolina, idling vehicles build up emissions that create an unhealthy environment for students and staff, and crowded conditions can result in safety issues for drivers and pedestrians (n.d.). According to the EPA, "in addition to improving the school's physical environment and minimizing potential health risks, school environmental health programs help local communities, schools, and school districts make healthy, safe, and cost-effective choices that address each school's environmental health priorities." (n.d.). Clean Air Carolina has provided recommendations to reduce the impact of school dismissal car lines, including:

- Clearly mark the designated drop-off and pick-up zone.
- Create clear procedures for the student pick-up process.
- Use a system to identify the proper car with the proper student.
- Have several escorts available to facilitate loading/unloading.
- Educate parents and caregivers on car line procedures and layout.
- Promote carpooling.
- Develop a walk-to-school program (Picarsic, n.d.).

Figure 8. Image from PikMyKid.com. (PikMyKid, n.d.)

Technological Solutions

There are web-based applications that are available to facilitate the vehicle pick-up process. A better managed dismissal process may reduce traffic congestion on affected roads. One company that has developed a web-based service for student dismissal is PikMyKid. PikMyKid offers real-time tools to facilitate the dismissal process more efficiently and claims that 81% of participants saw reduced traffic congestion (PikMyKid, n.d.). There are several companies that offer fee-based services to facilitate, and improve the vehicle pick-up process. However, at a meeting with a PikMyKid consultant, it was noted that the Tampa Bay Area Regional Transportation Authority (TBARTA) is offering a grant to provide the PikMyKid service to Tampa Bay area schools for one year. As of Spring 2018, TBARTA is offering the grants in an effort to reduce school traffic congestion (Manning, 2017).

Other Cities & Industry's Practices

      Carpooling. TBARTA is an organization that consists of a governing board, Citizens Advisory Committee, and a Transit Management Committee whose goal is to "offer transportation options that are safe, sustainable, affordable, and efficient" to the Tampa Bay region (TBARTA, n.d.). TBARTA's tips for starting a carpool is displayed in the graphic below.

• Don't be shy. Pick up the phone and call some of the people on your Match List. And don't be surprised if you get a call from someone who also wants to share a ride. • Arrange a get-together to get acquainted. Set up a time to meet over lunch or after work to discuss the possibility of ridesharing. Consider pick-up and drop-off times, driver and rider responsibilities, division of expenses, personal preferences such as playing the radio, smoking, eating and so on. If you sense you won't get along with a potential carpooler, trust your instincts. There is no need to push yourself into an uncomfortable situation. If a prospect looks good, however, work out the details and agree to participate for a trial period. Evaluate the situation as you go along. Later, if you aren't happy or comfortable with it, you can always bow out. • Let democracy rule. Devise and agree on the pool's rules right from the start: when payments, if any, are due; who collects them; who to call in case of an absence or delay; and so on. If something about the carpool bothers you, speak up. When a conflict arises, take a vote and abide graciously by the results. A successful carpool is the product of fairness multiplied by courtesy and common sense. • Take the responsibility of driving seriously. Make sure your auto insurance covers everyone in the car. Be vigilant when you are at the wheel. This means no drinking alcohol before the drive home, no speeding, and no aggressive driving or other forms of recklessness. Other people's lives are in your hands. Be firm! If there is a careless driver in your pool, don't put him or her behind the wheel.	• A clean car makes for a happy pool. The comfort of passengers is also in the driver's hands, and simple courtesy dictates that your car be clean when you drive. Trash on the floor and food on the seats are discouraging sights to riders. • Punctuality is paramount. A rider who anticipates being late should let the driver or other designated person know as far ahead of time as possible and offer to make his or her own arrangements for that trip. Likewise, a driver who will be late should arrange for someone else in the pool to drive. Also, if ridesharing everyday won't work for you, try carpooling at least two days a week. • Sit back and relax. For the protection of all, the driver needs to keep his or her eyes on the road. So, if you're a rider, don't feel obligated to talk all the time. Instead, take a nap, catch up on your reading, or just sit back and enjoy the scenery. • Avoid side trips. Make sure there's enough gas in the car for a round trip. Resist stopping or asking that stops be made to take care of personal business. These should be handled on your own time. • Register your carpool or vanpool. Once you are ridesharing at least two days per week, you are eligible to register for the Emergency Ride Home (ERH) Program. The ERH Program provides up to four (4) free taxi rides home per year in case of a family emergency, illness, unscheduled overtime or if your carpool driver is unable to take you home. (TBARTA, 2013).

Figure 9. TBARTA Tips for Starting a Carpool. (TBARTA, 2013).

Figure10. Image from Oregon Dept. of Transportation (n.d.)

Park-and-ride. Though ridesharing has evolved in recent years to include for-hire

private businesses (such as Uber and Lyft), "(t)raditional ridesharing means people pooling from

a common origin, such as a residence or park-and-ride lot, to a common destination, such as an

employer or business park." (Association for Commuter Transportation, n.d.). Ridesharing

includes the use of a park-and-ride program. A park-and-ride facility is an area dedicated for

individual drivers to park and transfer to a high-occupancy transportation option such as bus or

rail (Steer Davies Gleave, 2017). Regions in the United States and Canada have relied on park-

and-ride services to "extend the reach of traditional transit services" with objectives such as

reducing noise and air pollution, shifting parking away from high-density areas, and minimizing

disruptions to local businesses and residents (2017). A park-and-ride service can be adapted to fit

the needs of the users, including student transportation.

Experiential transportation. One way to engage ridership in an alternative transportation option is to provide the rider with a positive experience. There are companies, such as WeDriveU, that are centered on creating a positive experience for the customer while engaging in ridesharing (WeDriveU, n.d.). WeDriveU offers a fleet of vehicles that includes buses, shuttles, cars, and luxury sedans that can serve multiple purposes including serving as last mile shuttles, intercampus shuttles, or residential bus services (n.d.). On-demand pick-up/drop-off services, tailored commutes, available wi-fi, and experienced drivers are features that facilitate the positive customer experience (n.d.). Though tailored for corporate transportation, WeDriveU's practice of creating a positive customer experience during transit can be applicable to any transportation program, including school transportation.

Figure 11. School bus fun. (Image from Clip art, n.d.)

Conclusion

There are multiple sources available that provide best practice recommendations to improve the school vehicle pick-up process. With school choice programs growing in popularity (Tobin, 2018), the Pinellas County School district's transportation policies will contribute to increased environmental pollution and disrupt a growing number of community members. Considering best practice recommendations may reduce the impact that school transportation has on the environment and surrounding communities. The information discussed in the best practices chapter will be useful in the following chapter when making future recommendations.

VI. Recommendations for Improvement

The purpose of this chapter is to make, and evaluate, improvement recommendations for Gulf Beaches Elementary Magnet School's (GBEMS) student pick-up process. There are several critical issues that will be addressed relating to the current pick-up process, including increased traffic congestion in the community, increased vehicle emissions, and student/staff safety. The improvement recommendations will address these critical issues, and each recommendation will be evaluated for its feasibility and potential impact. The three improvement recommendations to be evaluated include: use an available web-based dismissal program (i.e. PikMyKid) to improve process efficiency and increase safety, use a parent/caregiver carpool program to reduce congestion and air pollution, and use available busing service to create a program similar to a park-and-ride system. This chapter will display a cost benefit analysis for each recommendation, followed by a decision matrix that will identify the improvement recommendation most suited to GBEMS's needs.

Cost-Benefit Analysis & T-Chart: Defined

Evaluation of the improvement recommendations included the use of a cost-benefit analysis (CBA) tool and a T-chart. A CBA is useful when accounting for, and making comparisons of, the benefits and costs that are associated with an improvement recommendation (MindTools, n.d.). Using a T-chart to display data is a "simple way to conduct economic analysis" (Gordon, 2013). The CBAs are displayed with benefits listed on the left side of the T-charts, and costs listed on the right.

Web-based Dismissal Program

   Recommendation. The first recommendation is for GBEMS to use an available web-based program to facilitate the student dismissal process. One company that has developed a web-based service for student dismissal is PikMyKid. PikMyKid offers real-time tools to facilitate the dismissal process more efficiently and claims that participants saw reduced traffic congestion, realized improved student safety, and experienced reduced dismissal times (PikMyKid, n.d.).

   Cost-benefit analysis. The CBA for implementing a web-based program to improve efficiency, safety, and congestion is displayed on the T-chart below.

Benefits	Costs
• Reduced local traffic congestion • Improved student/staff safety • Reduced student dismissal time • Reduced vehicle emissions (300-500lbs. CO2 reduced per week) • Greater accountability • Less impact on surrounding community • Grant money available for first year service (approx. $2500)	• Fees associated after first year (based on number of students) Approx. $2500 • Needs buy-in from parents and school staff • Training associated with learning system • Users require equipment with internet capability (i.e. smart-phone or tablet) • Fees associated with system upgrade or for additional capabilities

Figure 12. CBA for web-based dismissal. (Adapted from Gordon, 2013).

   Analysis. Lessening GBEMS's impact on the surrounding community and on the environment, and improved student and staff safety are key benefits that may be realized through this improvement recommendation. A key cost are fees associated with the service after the TBARTA grant expires (after year one) which is approximately $2500. Funding for the

continued use of the service would require district support or internal funding from sources such

as the school's Parent Teacher Association (PTA).

Carpooling Program

Recommendation. Another improvement recommendation intended to lessen the

impact of the school's student dismissal process is the incorporation of a carpooling program.

Carpooling can be an effective way to reduce traffic congestion, save money through reduced

gasoline use, and decrease air pollution by reducing vehicle emissions (The Eco Guide, 2015).

Carpooling may also provide parents and caregivers an opportunity to expand and improve their

social relationships within the school community (2015).

Cost-benefit analysis. The CBA for implementing a carpooling program at GBEMS is displayed

on the T-chart below.

Benefits	Costs
• Reduced local traffic congestion • Reduced vehicle emissions (20% less vehicles ≈ 300lbs CO2 emission reduction) • Reduced fuel use • Improved/new social relationships • Decreased time needed for car line process to complete • No third-party participation needed	• Fees associated with developing and promoting program Approx. $500 • Buy-in required by parents and caregivers • System to identify and track program participants • Renewing/promoting program each school year

Figure 13. CBA for initiating carpool program. (Adapted from Gordon, 2013).

Analysis. Multiple benefits can be realized by implementing and promoting a school-

wide carpooling program. Key benefits include reduced traffic congestion and reduced air

pollution through decreased vehicle emissions. A key hurdle will be gaining buy-in and

participation from the parents and caregivers responsible for student pick-up. One key benefit of this improvement recommendation is that it can be implemented at a school level and will not require third-party participation or district funding.

Park-And-Ride Program

> **Recommendation.** The third improvement recommendation is to use existing arterial bus services provided by the district to create a program like a park-and-ride system. Many communities use park-and-ride systems to extend traditional transportation services, such as bussing, to reduce traffic congestion, decrease air pollution, and minimize disruptions to local residents and businesses (Steer Davies Gleave, 2017). The GBEMS park-and-ride program can establish an area along the existing arterial bus route (e.g. city park or other public space, or in a private shopping complex) where parents can gather for student pick-up and drop-off. This would reduce the number of vehicles traveling into the school's community for pick-up and drop-off and decrease the distance traveled by families to attend GBEMS.

Cost-benefit analysis. The CBA for implementing a program similar to a park-and-ride system at GBEMS is displayed on the T-chart below.

Benefits	Costs
• Fewer vehicles entering local community • Reduced air pollution (20% less vehicles ≈ 300lbs CO_2 emission reduction) • Improved social relationships • Use existing arterial bus services • No fees associated with program • Decrease student dismissal times	• Requires buy-in from parents and caregivers • Methods needed for staff to identify participants • Establishing and promoting program Approx. $250 for promotional items • Potential need for outside approval or fees if certain spaces are used for student drop-off (e.g. parks or private parking lots)

Figure 14. CBA for park-and-ride program. (Adapted from Gordon, 2013).

Analysis. Establishing a system similar to popular park-and-ride programs in other high-density areas may have a significant impact on GBEMS's dismissal process. Key benefits include reduced traffic congestion, reduced air pollution, and the use of an existing arterial bussing service. Key hurdles include the potential need for outside approval for use of space and generating buy-in from the parents and caregivers.

Decision Matrix

Background. A decision matrix is a tool that enables the evaluation and prioritization of a list of available options (ASQ, n.d.). The proposed improvement recommendations are ranked numerically (1-5) based on their impact to the selected criteria including: costs, benefits to the environment, benefit to the school and community, acceptance by stakeholders, and ease of implementation. The selection criteria are then weighted based on their perceived importance.

Matrix. The decision matrix illustrating and ranking the three improvement recommendations is displayed below. The matrix displays the unweighted and weighted score for each of the proposed solutions below the criteria, a total weighted score is displayed on right.

Selection Criteria	Costs	Benefits: Enviro.	Benefits: School/Comm	Acceptance	Ease to Implement	
Proposed Solution (Criteria Weighting)	**(x2)**	**(x3)**	**(x3)**	**(x1)**	**(x1)**	**Total Weighted Score**
Web-based System	2 (4)	3 (9)	4 (12)	5 (5)	4 (4)	*34*
Carpooling Program	3 (6)	4 (12)	3 (9)	3 (3)	3 (3)	*33*
Park-and-ride Program	4 (8)	4 (12)	2 (6)	1 (1)	5 (5)	*32*

Figure 15. Decision Matrix. (Adapted from ASQ, n.d.).

Analysis. An analysis of the decision matrix indicates that all three recommendations were closely ranked. The improvement recommendation that is prioritized the highest is the incorporation of a web-based dismissal service. Although the web-based system is the option that carries the highest financial cost due to annual service renewal fees, the likelihood of acceptance

by staff and parents, and overall benefits to the environment and community, make it the top ranked option. Next, a carpooling program is a viable solution because decreasing the number of vehicles entering the community has both a positive impact on the environment and minimizes disruptions to local residents. Carpooling programs also improve social relationships by engaging parents and caregivers in a positive manner. Finally, a park-and-ride program can also reduce vehicle congestion and may offer parents a closer or more convenient pick-up and drop-off point. However, because parents currently have little interest in using the existing arterial bus service, gaining acceptance of the program may be difficult.

Conclusion

Three improvement recommendations were evaluated using a cost-benefit analysis tool and displayed on a T-chart. Information from the CBAs were then used as criteria to develop a decision matrix. The decision matrix indicated that incorporating a web-based dismissal service was the top ranked of the three recommendations. Information from this chapter will be used in Chapter 7 when developing an implementation plan.

VII. Implementation Plan and Change Management

The purpose of this chapter is to create and illustrate an implementation plan and a change management plan to improve the Gulf Beaches Elementary Magnet School's (GBEMS) current student dismissal process. Implementation of an improvement recommendation in an organization can prove to be challenging, but is necessary to realize any benefits from the recommendation (Anderson, 2007). In the text *Business Process Improvement Toolbox*, Anderson (2007) suggests that the main task of implementing an improvement should be broken down into several subtasks, including: sorting and prioritizing improvement proposals, organizing the implementation, developing an implementation plan, creating acceptance for change (change management), and carrying out the implementation (p.237). This chapter will include an implementation plan for the improvement recommendation that was prioritized the highest according to the previous chapter's decision matrix. That improvement recommendation is to use a web-based dismissal tool to improve the current dismissal process. This chapter is separated into sections, including: task planning, resource planning, a change management plan, and a conclusion.

Task Planning

        Task sequence. All the required tasks needed to implement the improvement recommendation were brainstormed and displayed using a tree diagram. A tree diagram is a useful tool when dividing large tasks into smaller, more manageable ones (Anderson, 2007). The tree diagram for the project provided a visual representation of the required tasks, organized to display the sequence needed to complete the project. Additionally, use of a Program Evaluation and Review Technique (PERT) chart and the Critical Path Method (CPM) provided further analysis of the required tasks. PERT charts allow the smaller, more manageable tasks to be assessed for the *time* needed to complete each one, and helps "keep (the) project on track" (Williams, 2017). CPMs are used to identify the "critical path" or, the "sequence of tasks that defines the minimum amount of time for the project" (Grover, 2002). Identifying the critical path is imperative, as any delay in the critical path will cause the entire project to be delayed. The PERT chart and the CPM chart are displayed below.
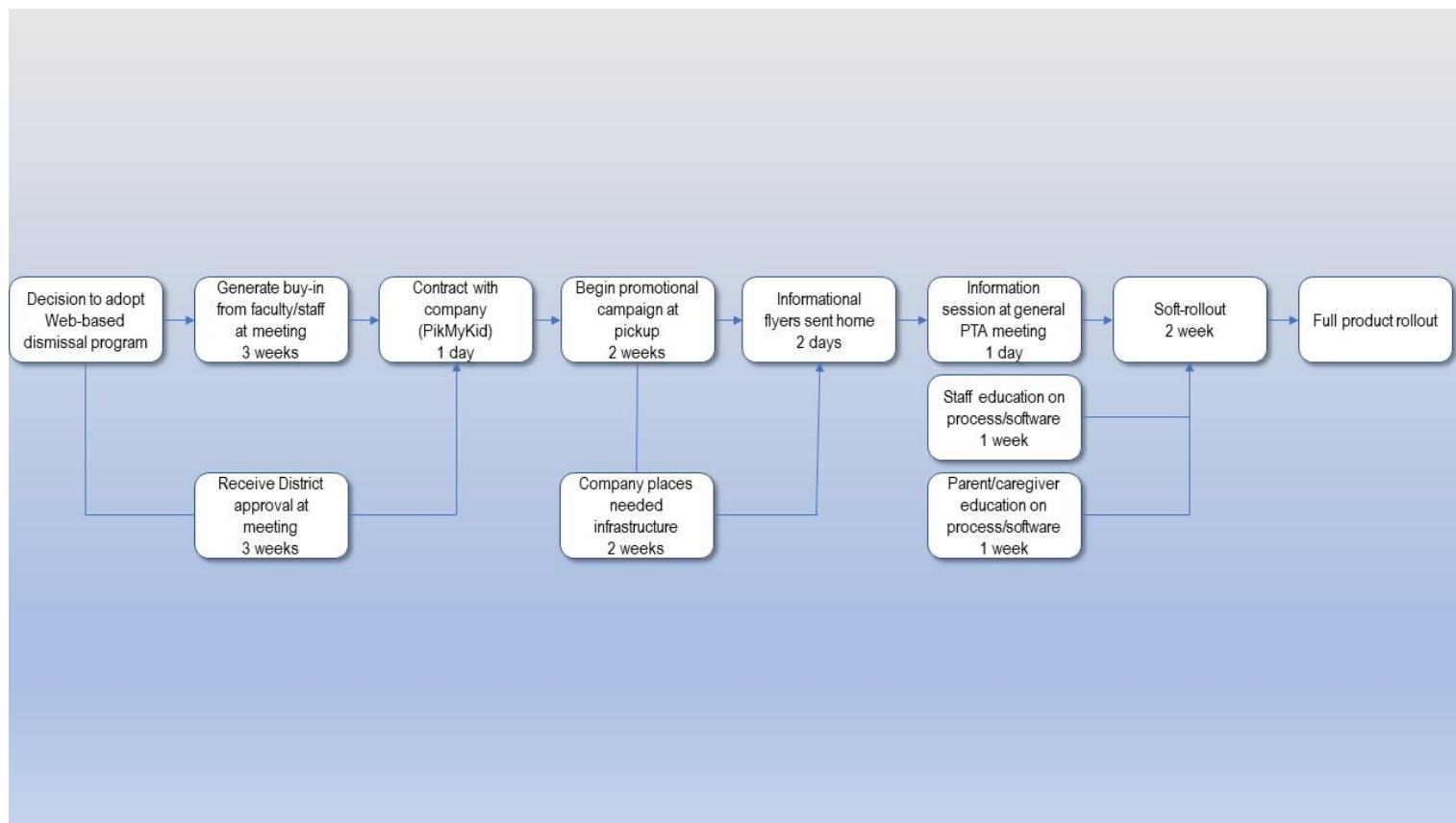
Figure 16. PERT Chart. (Adapted from Anderson, 2007)

The above PERT chart reflects the sequencing of tasks associated with adopting a web-based

dismissal program. Also illustrated are the time estimates needed to complete each task. The

Pinellas County School (PCS) District meetings and the GBEMS faculty meetings are held

monthly. Their time estimate reflects the time from the original proposal date, until the next
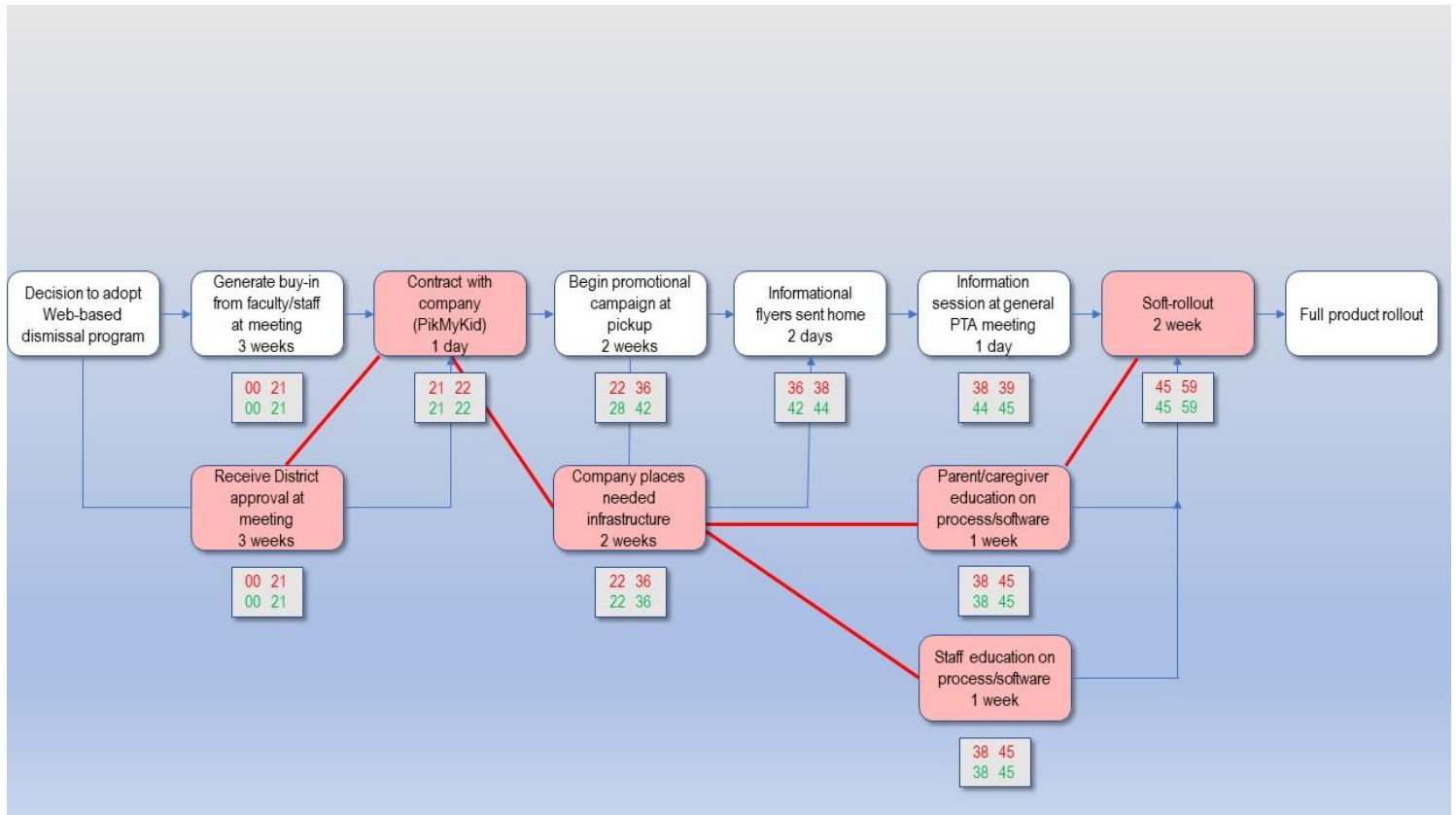
scheduled meeting.

Figure 17. CPM Chart. (Adapted from Anderson, 2007).

The above CPM chart identifies what tasks represent the minimum time needed for the

implementation of the improvement plan. Any delay in the critical path will cause a delay in the

completion date for the entire project. The critical path is represented by the red solid line and

shaded boxes. Appropriate approvals, contracting with the third-party company, system

infrastructure set-up, and staff/parent training are necessary tasks and are included in the critical

path.

Timeline. A Gantt chart is a bar chart often used to show the tasks of a project, accompanied with the length of time needed for task completion (ASQ, n.d.). A Gantt chart identifies the tasks needed to complete the project, key milestones, time required to complete, and the sequence of tasks (n.d.) A Gantt chart is advantageous in-part because start times and deadlines are clearly displayed, and task relationships are easily visualized (Grover, 2002). The Gantt chart for the improvement recommendation is displayed below.
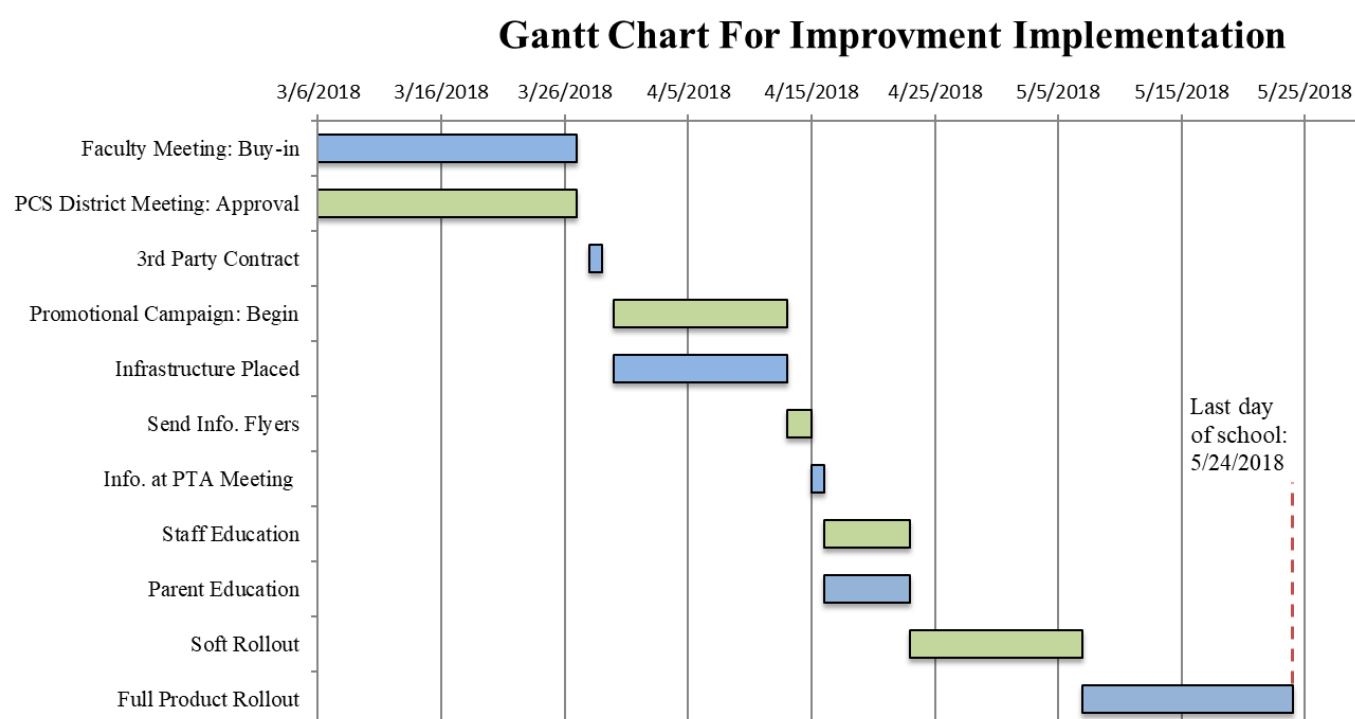
Gantt Chart For Improvment Implementation

Figure 18. Gantt chart. (Adapted from ASQ, n.d.)

The above Gantt chart provides a visual representation of the timeline needed to complete individual tasks during the implementation of a web-based student dismissal program. Noted on the chart is the scheduled last day of school for students in the 2017-18 school year (Pinellas County Schools, n.d.). Implementation should be complete prior to May 24th.

Resource Planning

Resources needed. The following table provides a list of the resources required to implement a web-based dismissal program at GBEMS. The table includes resources such as time, materials, equipment, skills, training, and costs.

Table 4. Resource requirements. (Adapted from Project Insight, n.d.)

Resource	Needs
Time	• Periods between meetings (Faculty/District meetings) • Principal's time: meeting 3rd party contractor, sending informational phone messages, supervising implementation • Staff & parents time needed for training • Time needed for service installation • Time at PTA meeting to promote service • Time to prepare and send home informational flyers
Materials	• Promotional campaign materials: stock paper and poster-sized advertisements • System software (downloadable application) • Educational handouts (step-by-step instructions) • Promotional materials for District and Faculty meetings (Buy-in)
Equipment	• Access to digital devices (e.g. smart-phone or tablet) for staff and parents • Contracted party's installed equipment
Skills	• Basic-level skills needed for application download and use (instructions will be provided) • Ability to follow instructions
Training	• Parents/caregivers attend instructional tutorial (virtually complete or attend one of multiple training times offered) • Staff training on system functions and use
Costs	• Annual service fees for contracted company after first year (approx. $1500) • Costs for promotional materials • Refreshments for training sessions • Company costs for installation and training

Change Management Plan

   Overview. Though change is constant, there will always be resistance to change from within any organization (Phillips & Gully, 2014). Recognizing the need for change and managing any barriers to change is key when attempting to implement organizational improvements (2014). There are several theory-based models available that relate to change management, including Lewin's Model of Organizational Change (2014). Lewin understood that there will always be forces that move an organization towards change (driving forces) and forces that attempt to keep the organization as-is (restraining forces) (2014). Lewin argued that for change to be successful, you must strengthen the driving forces and weaken the restraining forces (2014). These driving and restraining forces can be displayed using a Lewin's Force Field Analysis (FFA) model.

   Barriers. Resistance to change is a predictable behavior from individuals within an organization (Phillips & Gully, 2014). The resistance is often created by common barriers that hamper efforts to effectively implement the necessary changes. Managing common barriers is key during implementation of the improvement recommendations, as these barriers may be associated with the forces resisting change (2014). Common barriers are included in Table 5.

Table 5. Common Barriers to Change. (Adapted from Phillips & Gully, 2014)

Common Barriers to Change	
• Habits (or stable patterns of events that become routine) • Power and influence • Limited resources • Misunderstandings	• Saving face • Fear of the unknown • Tolerance for ambiguity

Potential barriers to change identified at GBEMS include the existence of habits related to the current system (especially among key process facilitators) and staff are not dissatisfied with the current system, there may be limited resources for later funding of the system, some parents and staff may experience fear related to switching to an unknown system, and some may resist change to "prove" that the new system is unnecessary or inappropriate (a.k.a. saving face). These barriers are also reflected in the FFA below.

Force field analysis model. Figure 19 displays the FFA relating to implementing a web-based student dismissal process at GBEMS. Forces pushing for change, or driving forces, are displayed on the left of the model. Forces obstructing change, or restraining forces, are displayed on the right. The degree of influence that each force has on the change process is indicated numerically, 1-4, with 4 indicating a strong influence and 1 a weak influence.
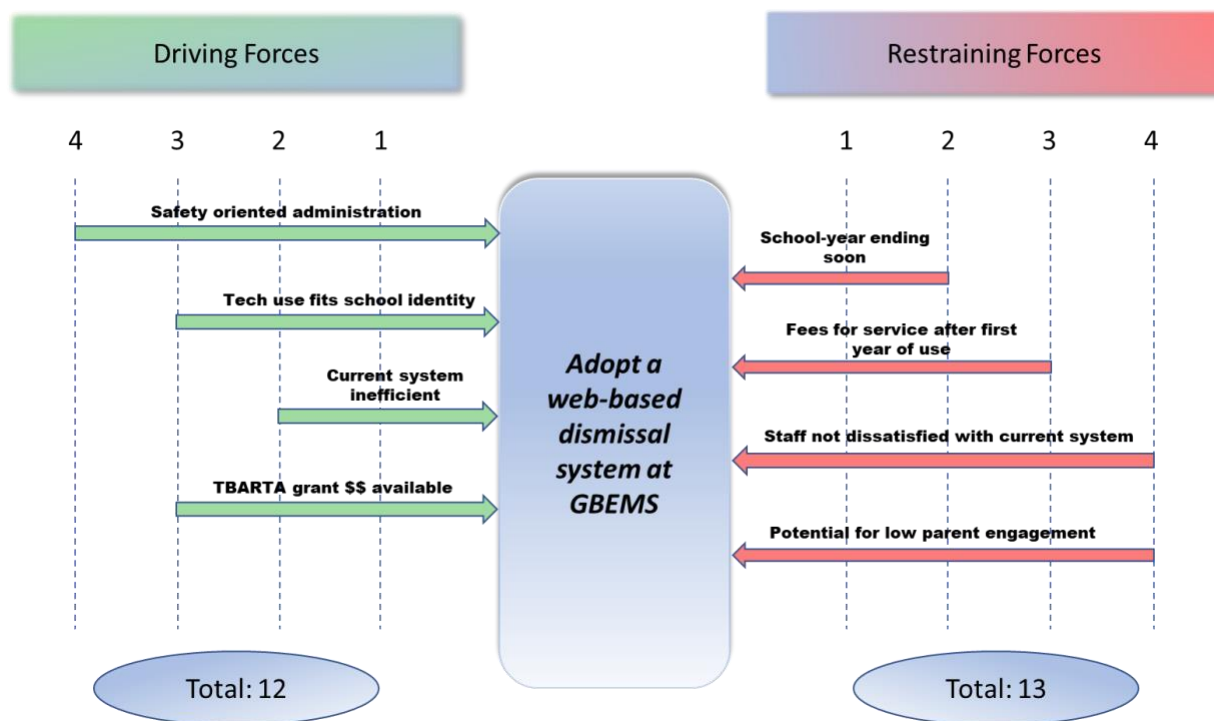

Figure 19. FFA diagram. (Adapted from Phillips & Gully, 2014)

The FFA diagram indicates that there are more, or stronger, restraining forces than driving forces, showing a potential need for change. The FFA shows that one potential barrier to change exists in the form of old habits. The current dismissal system has been in place, with the same essential staff operating it, since the school re-opened several years ago. The key staff that facilitate the current process are not currently dissatisfied, creating a potential barrier to change. Engagement with those individuals will be key when gaining buy-in from staff. Also, with the current school year coming to an end relatively soon, the window to implement the improvement recommendation by this school year is closing.

    Action plan. Creating an action plan based on the results of the FFA, with the intent of strengthening the driving forces and weakening the restraining forces, will facilitate positive change within GBEMS. Reaching the Early Majority and Late Majority of process adopters, according to Rogers' Theory of Diffusion of Innovations, will be key as they represent the largest segment of adopters (LaMorte, 2016). A meeting with the key process facilitator will help facilitate buy-in and encourage that individual to become an Early Adopter, representing the opinion leaders (2016). The action plan will reflect these needs. According to the New Jersey School-Age Care Coalition (NJSACC), an action plan creates an outline for how to accomplish key tasks, or actions, within a clearly specified time frame (n.d.). The action plan for GBEMS is included in the table below.

Table 6. GBEMS action plan. (Adapted from NJSACC, n.d.).

	Action	Person(s) Responsible	Completion Date
1	Meeting with PikMyKid (3rd party contractor)	Author/Principal/PikMyKid staff	3/16/2018
2	Begin to gain staff buy-in at next faculty meeting	Principal	3/27/2018
3	Attend next District meeting to seek approval	Principal	3/27/2018
4	Meet with key facilitators of current process to seek new process input	Author	3/28/2018
5	Contract with 3rd party provider (PikMyKid)	Principal/PikMyKid staff	3/28/2018
6	Develop team for promotion of new service	Author/School staff	4/2/2018
7	Follow-up with key process facilitators	Author	4/13/2018
8	Promote service to help gain parent buy-in at next PTA meeting	Author/Principal	4/16/2018
9	Seek parent input via survey	Author/Parents	4/20/2018
10	Rollout new service	All	5/10/2018
11	Review company (PikMyKid) data to gage service adoption rate	Author	5/23/2018
12	Plan training/information for new and returning parents for next school year	Author	Ongoing

The above action plan was created based on the results of the FFA. It indicates clear objectives with dates to be completed that will influence the restraining and driving forces. It will be key to accomplish the identified actions by the completion dates, as the end of the current school year is nearing.

Conclusion

The purpose of this chapter was to create and illustrate an implementation plan and a change management plan to improve the Gulf Beaches Elementary Magnet School's (GBEMS) current student dismissal process. Using Lewin's change management theories, an implementation and change management plan was developed. Tools used to develop the plans include a PERT chart, CPM chart, Gantt chart, FFA, and an action plan. Potential barriers to change were identified and will be useful knowledge when implementing the recommendations. The information provided in this chapter will be useful later in the report when creating standardizations and measuring results in Chapter 9.

VIII. Measuring Results

The purpose of this chapter is to review the results of a simulation that involved the training, implementation, and use of the PikMyKid web-based student dismissal service. Use of the web-based dismissal service has been recommended to improve the efficiency of the current student dismissal process at Gulf Beaches Elementary Magnet School (GBEMS). Also included in this chapter are the results and measurements used to gauge the impact of the improvement Measuring and evaluating the improvement recommendation is necessary to successfully meet the organization's change goals (Office of Energy Efficiency & Renewable Energy, n.d.). Because a significantly-sized pilot is not feasible at this time, results from current PikMyKid system users and case studies provided by the company will be used, in part, to determine the system's impact on the time needed to complete the car-line process. A PikMyKid director allowed the report's author special access to the system's training videos to evaluate requirements needed by school administrators, teachers, and parents to download, access, and use the PikMyKid system. The chapter will include the estimated time to complete the training materials and address any required equipment needs. Sections of this chapter include results from the training simulation, plans for evaluating and measuring the improvement results, and a conclusion.

Training Simulation

   Videos and instruction sheet. PikMyKid offers multiple training videos intended to

instruct school administrators, teachers, and parents on the system's use (PikMyKid, n.d.). The

available videos for administrators and teachers, including estimated length and a brief

description (when applicable) are included in Table 7 below.

Table 7. Training Videos for Teachers and Admin. (Adapted from PikMyKid, n.d.)

	Administrators	Teachers
Videos	• Overview for Admin Settings - Exclusive video for school administrators who focus on initial setup and key configurations of the portal. Length: 7min	• School Portal Training - Covers all the features that teachers should know about the PikMyKid program. Length: 14min
	• School Portal Training - Covers all the features that administrators should know about the program. Length: 14min	• How to Send Message to Parents. – Length: 2min
	• Managing Students –Focuses on updating student records & schedule change management. Length: 4min	• Generating Reports - Review pick up changes, daily dismissal plan or real-time dismissal summary at the end of the day. – Length: 2min
	• How to Send Message to Parents. Length: 2min	• Getting Started with the Dispatcher. – Length: 6min
	• Generating Reports - Review pick up changes, daily dismissal plan or real-time dismissal summary at the end of the day. Length: 2min	
	• Getting Started with the Dispatcher. – Length: 6min	
Total Time	**35 minutes**	**24 minutes**

   The above table reflects the necessary training required for administrators and

teachers to begin using the PikMyKid dismissal service. The company recommends allotting one

hour to complete the necessary training (PikMyKid, n.d.). The videos provide clear instructions,

with graphics, that support system learning. The instruction sheet for parents, available from

PikMyKid, is summarized in Table 8.

Table 8. Parents Instructions. (Adapted from PikMyKid, n.d.)

Parent Instructions		
Download app from phone's app store (iTunes, Google-Play, etc.) and register your personal information. (Note: each parent's or caregiver's phone will need to be registered).		
To allow someone besides yourself to pick-up your child.	**To change the way you or the other parent will pick-up your child.**	**To send your child to and after school program or club.**
1. Press the stylus icon to the right of the school's name 2. Select the child's name 3. Select the applicable calendar date 4. Select *"Delegate"* and continue 5. Choose the person's name from your contact list that pops up 6. Select the 10-digit mobile number (used to register with the PikMyKid App.) 7. Choose from the drop-down menu how they will be picking up your child & decide if it is a recurring (repeating) change— if so, for how long and how often (weekly, daily, monthly, etc.). 8. Press Done! You will then see a dot for those calendar dates and the school will have it in their dismissal schedule.	**1.** Press the stylus icon to the right of the school's name **2.** Select the child's name **3.** Select the applicable calendar date 4. Select **"Change Pick-Up Mode"** and continue **5.** Choose from the drop-down menu the way your child will be picked up & decide if it is a recurring (repeating) change— if so, for how long and how often (weekly, daily, monthly, etc.). **6.** Press Done! You will then see a dot for those calendar dates and the school will have it in their dismissal schedule.	**1.** Press the stylus icon to the right of the school's name **2.** Select the child's name **3.** Select the applicable calendar date **4.** Select **"After School Programs"** and continue **5.** Choose from the drop-down menu the correct After School Program & decide if it is a recurring (repeating) change— if so, for how long and how often (weekly, daily, monthly, etc.). **6.** Press Done! You will then see a dot for those calendar dates and the school will have it in their dismissal schedule.

The parent instruction table provides step-by-step instructions for basic use of the PikMyKid dismissal service. A document that includes the instructions is available on the PikMyKid website and company support staff are available for further inquiries or instructions (PikMyKid, n.d.). The application was easily located on the internet when conducting the simulation.

Summary of training. From the simulation, it is estimated that the time needed for parents, administrators, and teachers to familiarize themselves with, and initiate, the PikMyKid service is approximately one hour. All training videos are provided by the company and clearly labeled. Additionally, support from the company is available for user assistance if needed. The major impact of the improved process will be realized once the system is in place and the time needed for the car-line to be complete is reduced. The simulated download and training was straightforward and thorough. If the web-based dismissal service is instituted at GBEMS, a survey of teachers and parents will be conducted to assess their perspective on system access, training, and usability.

Evaluating and Measuring

Overview. The primary goal of the improvement recommendation for GBEMS is to improve the efficiency of the current car-line dismissal process by reducing the amount of time needed for the process to be complete. To evaluate and measure the process, it must first be mapped (Global Environmental Management Initiative, 1993). The method used to map the current and improved process in this report is based on tools adapted from Total Quality Environmental Management (TQEM) process improvement methodologies. TQEM is a system

that promotes "continuous improvement" and seeks to meet current needs while anticipating future needs (1993). TQEM follows principles from Total Quality Management (TQM) and applies TQM strategies to better reflect improved environmental management (1993). A TQEM flow chart illustrates areas in the process where change is needed (1993), and is used to display the current dismissal process and the improved process below.

Current state flow chart. Documentation of the current state of the process is shown in Figure 20. It is displayed using a flow chart, or "a graphic depiction of the flow of activities in a process" (Anderson, 2007).
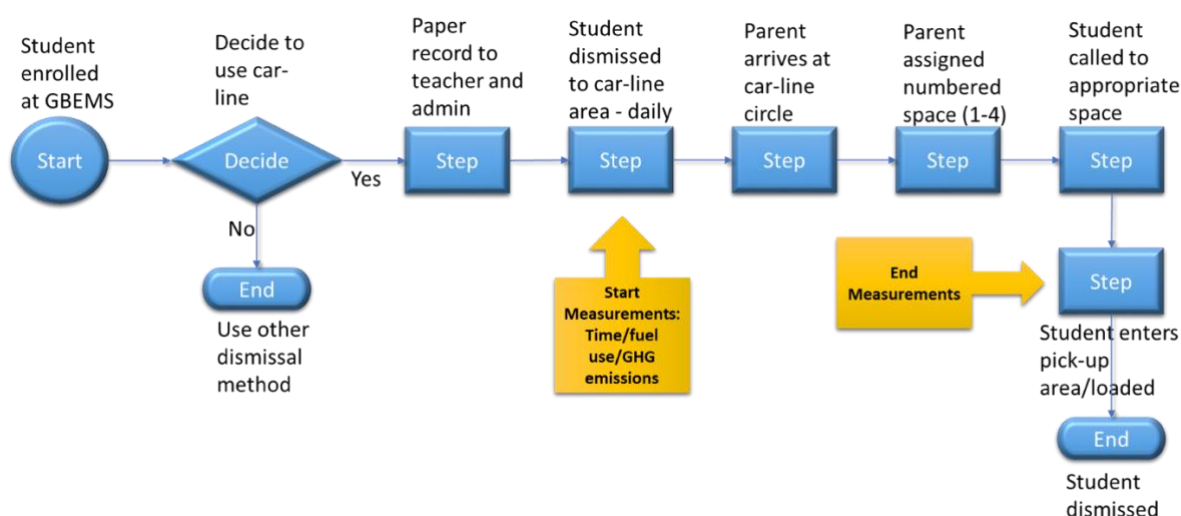

Figure 20. Current Process Flow Chart. (Adopted from Anderson, 2007).

The above flow chart represents the current car-line dismissal process. The paper record indicating dismissal preference is submitted by parents at the beginning of the school year, and any changes are required to be made through the school's administration office. Currently, once the students are grouped in the car-line waiting area, a school staff member announces the student's name using a megaphone when the parents are visualized entering the car-line

dismissal area. In Chapter 4 of this report, the established average time to complete the current

process was 30 minutes, depending on the number of vehicles using the process on any given

day.

> **Designed improved process.** The recommended improvement is designed to

decrease the amount of time needed to complete the car-line process. A process flow chart was

created to identify the steps needed to complete the improved process. The improved process
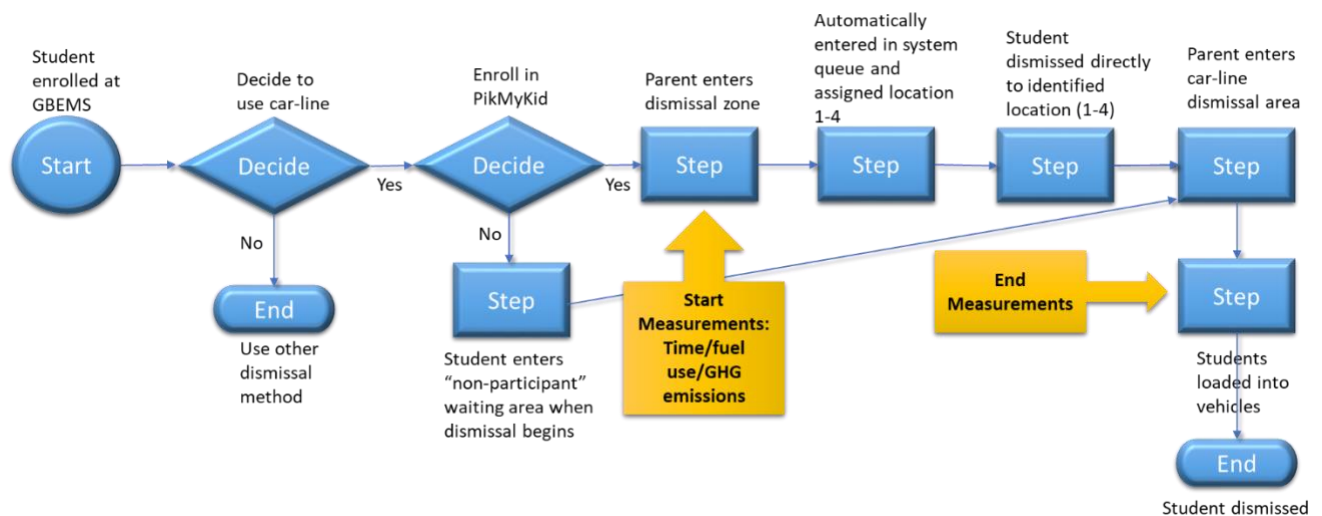
flow chart is shown in Figure 21.

Figure 21. Improved Process Flow Chart. (Adapted from Anderson, 2007)

The above flow chart represents the improvements to the car-line dismissal process. The greatest

potential to realize improvement is via the automation of the system. An electronic boundary is

placed according to the school's needs (where process occurs). When the participating parent

enters the monitored area, the vehicle is automatically assigned a queue location. The

participating students are then dismissed directly to the assigned area. This will decrease the

amount of time needed to dismiss the student and the amount of dismissal staff required to implement the process.

Measuring. The primary metric used to measure the effectiveness of the improvement is the amount of *time* needed to complete the car-line dismissal process. Reducing the amount of time needed to complete the process will result in a decrease in disruptions to members of the immediate community, decrease in amounts of emissions emitted by idling vehicles, and a decrease in resources needed for student dismissal (staff and staff's compensated time).

To gauge the effectiveness of the recommended improvement, the time to complete the car-line should be directly observed. The task of observing and noting the process time can be delegated to one of the student assistants (safety patrol). Daily measurements over a two-week period should be collected. The information can be recorded directly to a check sheet, and then entered into a run chart for visualization of the improvement. To help develop a hypothetical run chart for GBEMS, information obtained directly from case studies provided by PikMyKid were used. The case studies highlight some improvements realized by current users of the system. As reported by PikMyKid, 75% of current system users saw a reduction in the car-line process time (PikMyKid, n.d.).

Reduced process time will relate to vehicle emission reductions as well. As discussed in Chapter 4, a 10-minute reduction in process time (from 30 min. to 20 min.) can reduce vehicle carbon dioxide emissions by 450 pounds each week. Savings formulas are displayed below and are adapted from information provided in Chapter 4.

<div style="text-align: center;"><u>30 minutes</u></div>

346 (Car line total) x 0.39 (gallon/hr.)/2 (30 min process) x 20 (lbs. CO2 per gallon)

346 x 0.195 x 20

67.47 x 20 = 1,349.4 lbs. CO2

<div style="text-align: center;"><u>20 minutes</u></div>

346 x 0.39/3 (assuming 20 min process) x 20

346 x 0.13 x 20

44.98 x 20 = 899.6 lbs. CO2

(67.47 gallons - 44.98 gallons = 22.49 gallons of gasoline and 450 lbs. of CO2 saved each week)

Run chart. The run chart for GBEMS's car-line dismissal process is shown in Figure 22. In a run chart, the *y*-axis is the variable being measured (time) and the *x*-axis is the process (car-line dismissal) divided into segments (days 1-16) (Anderson, 2007). A run chart can be an effective tool for visualizing the time needed for the process to be complete over a designated period of time, and to realize any improvements (2007).
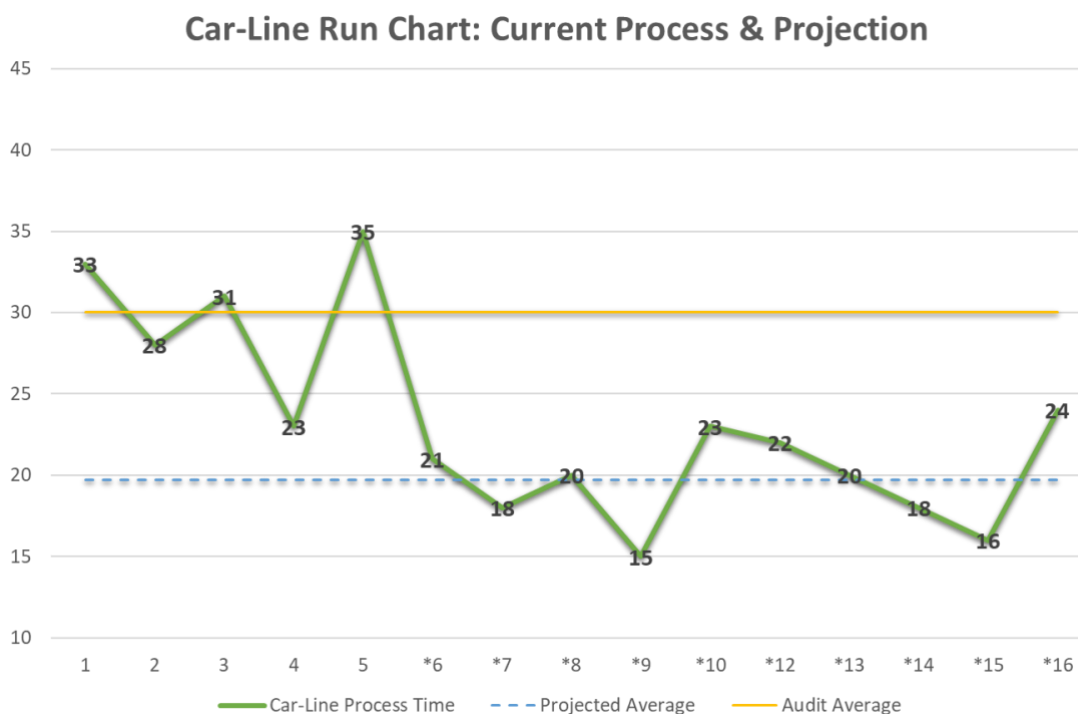

Figure 22. Run Chart for Current and Projected Process. (Adapted from Anderson, 2007)

Days 1-5 on the run chart include actual observed process times, while days 6-16 (marked *) are projected times based on feedback from current system users. The run chart reflects an observed average process time of 30 minutes, and a projected average time of almost 20 (19.7) minutes. The observed process times varied depending on the number of vehicles participating in car-line dismissal each day. The improved process projection assumes a 35% reduction in process time to reflect current user's results. PikMyKid indicates that current users have realized up to a 40% decrease in time needed to complete the car-line process (PikMyKid, n.d.).

Conclusion

This chapter reviewed the results of a simulation that involved the training, implementation, and use of the PikMyKid web-based student dismissal service. Also, the above run chart displays measurements of the proposed improvement's impact. The primary resource conserved is time. Reduced process time can relate to decreased vehicle emissions and decreased traffic congestion. If GBEMS adopts the PikMyKid system, actual data (process time) will be collected during the 2-week soft-rollout period. Additionally, if initial parent engagement is low, a survey will be conducted to identify specific barriers to program adoption to increase parent participation. High levels of parent engagement will maximize the realized benefits of the new service. The information in this chapter will be useful in the following chapter, Chapter 9, when reviewing standardization and compliance recommendations.

IX. Standardization and Compliance

The purpose of this chapter is to introduce methods to standardize and sustain the implemented improvement at Gulf Beaches Elementary Magnet School (GBEMS). Standardization is essential in controlling any process (Tidd & Bessant, 2013), including car-line dismissal at GBEMS. This chapter, in part, will define the steps needed to standardize the improved process. Defining "clear and consistent" steps needed to complete the targeted process is key during standardization (Taurman, 2009). Additionally, compliance with any applicable regulations, from the city, state, or other governing bodies, will be addressed in this chapter. Standardization and compliance recommendations for the improved GBEMS car-line dismissal process follows.

Standardization

Overview. Consistency in a process can be achieved through standardization (Davis, 2016). One challenge to consistency that applies to GBEMS is the amount of turn-over experienced each year. Every year there are new faces in the GBEMS community, as new students and families come in, and older students move on. Process standardization and "well-crafted documentation" of the car-line dismissal system will allow for easier training for new system users, and serve as refresher training for any returning families that have the need (Tidwell, 2015). Process standardization of the GBEMS car-line dismissal service will include creating and documenting new policies and procedures, the inclusion of visual controls to facilitate system use, and the development of a training plan.

Policies and procedures. Policies provide guidelines and rules for a process and are the foundation for standardization (SweetProcess, n.d.). Procedures provide detailed, step-by-step instructions that describe exactly what needs to be done in the process (Saint Louis University, n.d.). Developing clearly written car-line dismissal policies and procedures provides new system users, and returning users, the necessary information to appropriately access and use the service. At GBEMS, policies are developed and issued through school administration (Principal and administrative staff). Any changes to existing policies, or decisions to include new policies, will be made and distributed through the administrative office.

PikMyKid has developed video tutorials intended for use by administrators, teachers, and parents, that provide detailed instructions relating to accessing the system and system functions. As discussed in Chapter 8, the video tutorials are available on their home website. Additionally, GBEMS may develop procedures specific to their needs, including how parents can identify their preferred method of dismissal, and how they can opt-out of the automated dismissal service if they wish. Procedures for downloading and accessing the PikMyKid application should be included on the GBEMS website.

Visual controls. Adding visual controls to a standardized process is one method to ensure that critical steps in the process are clearly understood (Visual Workplace, Inc., n.d.). Visual controls should include the use of signage that clearly designates individual spaces for student pick-up (numbered 1-6 at the point of pick-up). Proper signage is a major component to using visual controls for process standardization (Visual Workplace, Inc., n.d.). The dismissal system will automatically assign and direct parents to pick the student up at the appropriately numbered spot.

Effective visual controls are also made available at "the point-of-use" and provide additional instructional information, or supplement other work instructions (n.d.). An example of a point-of-use visual control for the PikMyKid dismissal service would be to provide screen-shots of critical steps for teachers and administrators to reference while using the system (especially during initial system use). The visual controls would be specific to the user's role. An example of using screen-shots as a visual control is displayed in Figure 23.
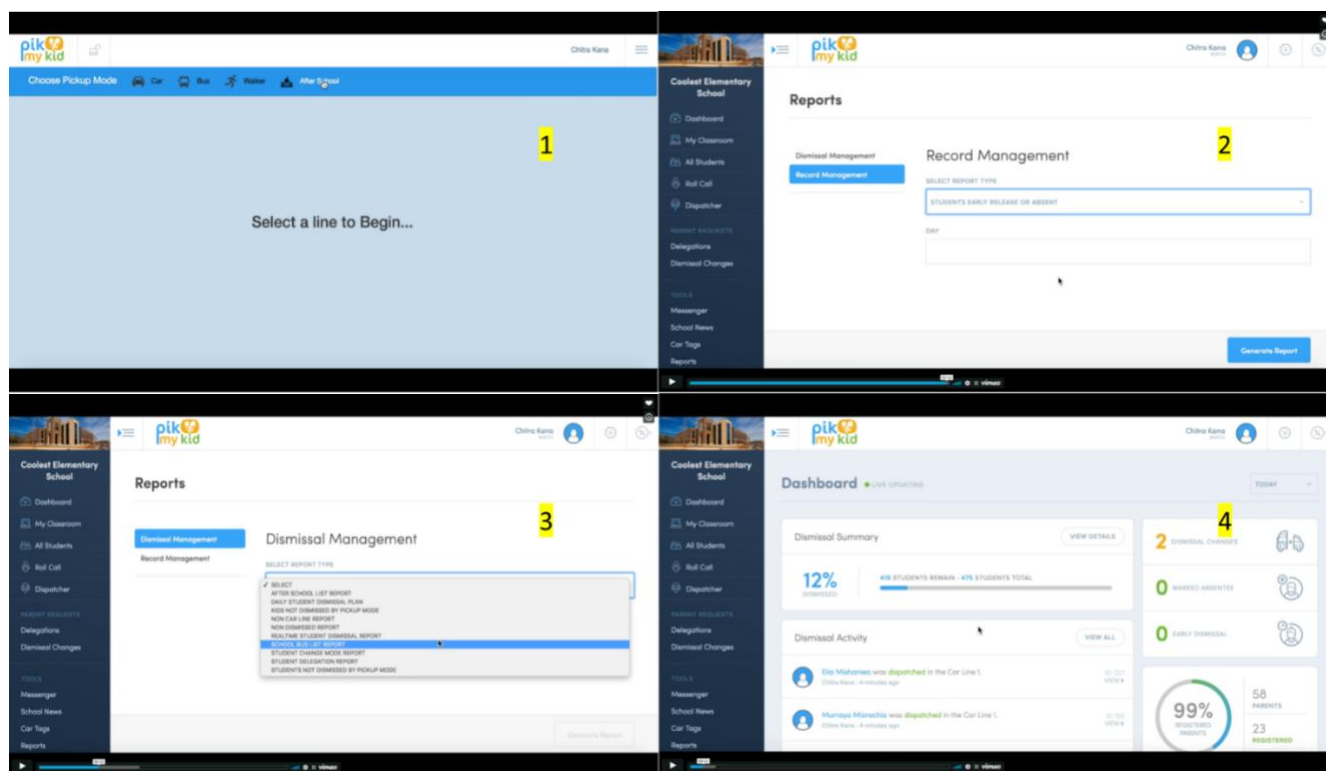

Figure 23. Visual Controls for PikMyKid. (Adapted from PikMyKid, n.d.)

System use instructions for PikMyKid are made available in training videos on their website. Using these instructions to create visual controls detailing the step-by-step process and placing appropriate and visible signage in key locations are effective methods that help standardize the process.

Communication plan. When creating new policies, or making policy changes, maintaining clear and effective communication with the necessary individuals is an important step (Society for Human Resource Management, 2015). The following communication plan will effectively inform GBEMS staff and families of the changes made to the car-line dismissal process and provide a record of the families preferred dismissal method, including those who choose to adopt the automated dismissal service.

Table 9. Communication Plan for GBEMS. (Adapted from GoLeanSixSigma.com, n.d.)

Communication Plan for GBEMS Car-Line Dismissal Process Changes				
Who	What	Why	When	How
Staff	Information about upcoming changes and training options	To inform all staff of changes and training requirements/ availabilities	As soon as decision to adopt process change is made	Virtual "town-hall" style meeting and informational e-mail.
Parents	Information about upcoming changes and required steps to enroll	To provide information on necessary steps to enroll in student dismissal service	As soon as decision to adopt process change is made	SchoolMessenger message (voice call). Flyer in student's take-home folder, and e-mail.
Parents	Dismissal type enrollment form	Document intended mode of dismissal	At beginning of school year or when student begins	Add option for automated car-line pick-up to existing beginning-of-the-year documentation.
Staff	How to document and make necessary updates relating to student/parent dismissal choice in existing system	Accountability and informational gathering relating to new process adoption	When process is adopted and when new staff begins	Written step-by-step instructions delivered electronically and placed in new-employee training folder.
Parents	Information relating to system benefits and current process adoption rates	To generate interest in new process	First and last PTA meetings of the school year	Informational flyer and brief presentation (by company representative or a parent that has adopted and/or understands the process).

Training plans. As mentioned, one challenge to consistency in the car-line dismissal process at GBEMS is the turn-over of system users. New parents and students arrive each year (and, to a lesser extent, through-out the school year) and will require training relating to the use of the automated car-line dismissal service. GBEMS will need to develop a training plan that clearly indicates their specific process. An effective training plan will include training goals, learning objectives, learning activities, documentation, and a method of evaluation (McNamara, n.d.). An example of a training plan for use of PikMyKid dismissal service at GBEMS is included in Table 10 below.

Table 10. Example Training Plan for GBEMS. (Adapted from McNamara, n.d.)

Training Goal	Learning Objective	Learning Activities	Documentation	Evaluation
1. Access PikMyKid student dismissal system. 2. Use PikMyKid student dismissal service.	1. Exhibit proper system access by week 1 of new school year (or within 1st full week at GBEMS). 2. Exhibit proper use of the system (following queue prompts from system during pick-up).	1. Access PikMyKid application. 2. Download system application. 3. Follow registration instructions. 4. Print registration certificate.	1. Keep printed registration completion certificate. 2. Deliver copy of certificate to student's teacher or administrative office.	Exhibit proper use of car-line dismissal service.

Compliance

Adopting a program that promotes student safety will improve GBEMS's compliance with rules set by the Florida Department of Education (FLDOE) and the Pinellas County School Board (PCSB). Florida statute 1006.21, authorized by the State Board of Education, asserts that district superintendents are responsible for ensuring safe student transport to and from school (Online Sunshine, n.d.). The PCSB's Policy 8600 governs school transportation, including safe student transport (PCSB, n.d.). The PikMyKid dismissal system improves student safety through automation and improved accountability, and will impact compliance with these rules and regulations. GBEMS will also be required to receive local district approval for use of any third-party service, including PikMyKid.

Conclusion

Sustaining the improvement to the GBEMS car-line dismissal process can be achieved, in part, through standardization. Methods used to standardize the improved process at the school include creating and documenting new policies and procedures, creating and implementing visual controls to facilitate system use, and the development of a new-user training plan. Additionally, compliance with regulatory bodies influence decisions made at GBEMS. The Florida Department of Education, Pinellas County School District, U.S. Green Building Council, and the Environmental Protection Agency all provide guidance that ensures GBEMS operates in a safe and healthy manner.

X. Conclusion

The purpose of this chapter is to provide a summary of the proposal made to Gulf Beaches Elementary Magnet School (GBEMS) to improve their student dismissal process. This chapter's sections include a summarization of the improvement project, potential future opportunities of the proposal, and lessons learned through the improvement process. It is important to identify that GBEMS has cooperated fully with all requests, and the school's administrators have been very accommodating regarding facilitation of the improvement project.

Project Summary

The improvement project developed for GBEMS intends to decrease the impact that the school's car-line dismissal process has on the environment, decrease the number of staff and staff-hours needed to facilitate the process, decrease time spent by parents in the car-line, and decrease disruptions to the community surrounding the school. The most efficient and effective way to accomplish the project's goals, and improve the GBEMS car-line dismissal process, is through system automation. Adopting a web-based, automated dismissal system can decrease the amount of time needed to complete the dismissal process (PikMyKid, n.d.). A decrease in process time will relate to a decrease in vehicle emissions, a decrease in fuel used during student pick-up, and a decrease in traffic congestion in the surrounding community. The web-based dismissal application also includes features that improve school accountability and overall student safety (n.d.). Key impacts of the proposed improvement are included in the table below and assume that the process time is decreased by approximately 33% from an average time of 30 minutes, down to 20 minutes.

Table 11. Improved Process Impact Summary. (Adapted from Menezes, n.d.)

Summary of Improved Car-Line Process Impact				
Carbon Dioxide Emissions	**1- Week**	**1-Month**	**1-School Year**	**5-School Years**
	0.20 metric tonnes	0.82 metric tonnes	7.35 metric tonnes	36.74 metric tonnes
Fuel Savings	22.49 gallons	89.96 gallons	809.62 gallons	4,048.1 gallons
Parent/Staff Time	0.83 hours	3.33 hours	30 hours	150 hours
All values are approximate and represent decreases from the current state. *Time value is per participant (i.e. each parent will save 30 hours each year and staffing hours are reduced per employee)* *Metric tonnes = 1,000 kg (2,204.6 lbs.)*				

The table above highlights the impact that an improved car-line dismissal process can have at

GBEMS. The greatest environmental impact will be realized through decreased vehicle

emissions, and decreased use of finite resources such as gasoline. Financial impacts include fuel-

cost savings and a decrease in staffing needs to facilitate the process. Reducing fuel use by

almost 810 gallons each year would relate to about $2,146 in savings based on an average of

$2.65 for a gallon of gas (AAA, 2018).

While placing a value on each parent's time is difficult, staffing hours can be easily quantified. The median pay for an elementary school teacher in Florida is $22.79 per hour (TeachingDegree.org, n.d.). Based on that average, the savings per staff member would be almost $684 each year through reduced staffing needs. The impact summary indicates that the financial savings could outweigh any costs associated with contracting a company for system access and use.

Future Opportunities

There are several future opportunities that can stem from this initial project. One opportunity is to expand the use of the web-based, automated dismissal service. Expansion could first take place on a local level (i.e. within the school, to include parents that are not already participating in the service). This could be accomplished through broad promotion of the service at open meetings (e.g. PTA general meetings), and targeted promotion to parents that are not participating. Those individuals could be identified through the creation of a database at the school level that tracks system use, or through automated reports provided by the contracted third-party. If the improvement recommendation is effective at GBEMS, the program could be expanded to include more schools in the district, or adopted by more districts in the State. That potential expansion is highlighted below with a Venn diagram, which uses overlapping shapes to indicate logical relationships (Lucidchart, n.d.).
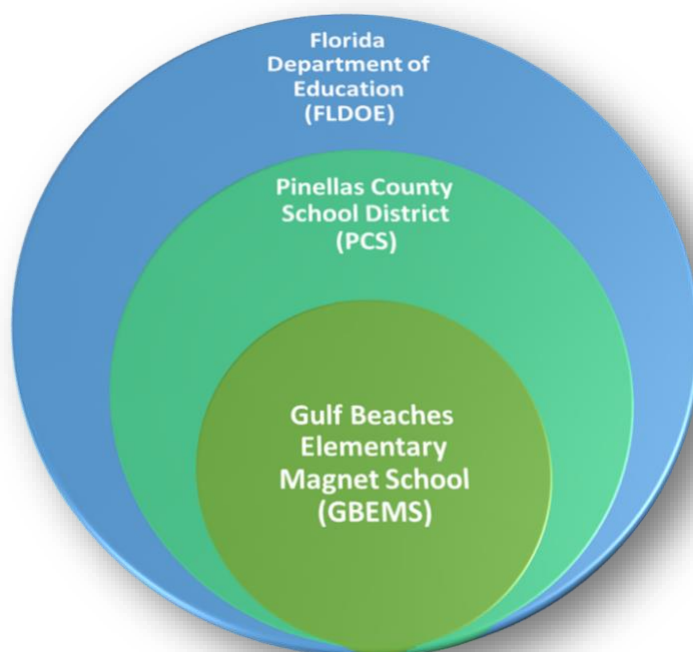
Figure 24. Program Expansion Diagram (Adapted from Lucidchart, n.d.)

Another future opportunity would be for GBEMS to use this improvement project as a catalyst to develop a broader sustainability plan. There are several voluntary compliance programs that GBEMS could use to guide sustainability-related improvements. One of these programs is the Environmental Protection Agency's (EPA) School Environmental Health program (EPA, n.d.). This program provides a voluntary framework that schools can apply to effectively promote health and safety in schools (n.d.). The EPA's Healthy School Environment program provides guidelines that "address a broad range of issues that affect children's health in schools, from selecting appropriate locations for schools to maintaining the buildings and grounds." (n.d.). The provided resources and guidelines assist school's while assessing their environmental health and implementing improvement projects (n.d.).

One other voluntary compliance program that GBEMS could consider is sponsored by the U.S. Green Building Council's (USGBC) Leadership in Energy and Design (LEED). LEED for Schools specifically rates educational institutes based on the commitment to sustainability within the organization (USGBC, n.d.). The USGBC operates a Center for Green Schools that provides facts and tools that highlight the "benefits and costs of green schools, including the ways green schools foster learning, decrease student and teacher absenteeism from respiratory and other illnesses, reduce energy and water bills, and provide models for teaching the world's future leaders about sustainability to benefit communities for generations to come." (Matthews, n.d.)

Figure 25. USGBC's Center for Green Schools. (Image from Matthews, n.d.)

Lessons Learned

Multiple lessons can be taken away from the improvement process at GBEMS. The identification of specific stakeholder needs, special planning needs relating to process change at public schools, and lessons relating to financing projects at a public school provide examples of lessons learned through the process. A Venn diagram is used to indicate the relationships of the lessons learned (Lucidchart, n.d.)
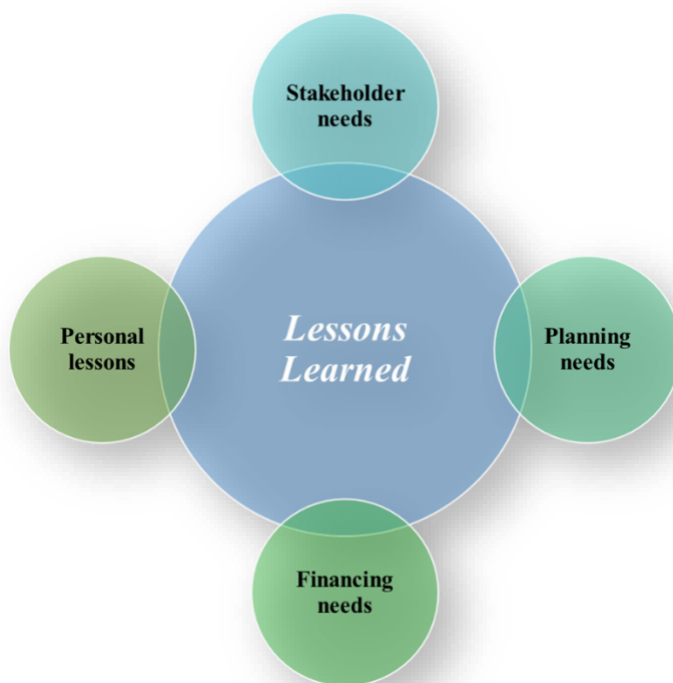
Figure 26. Lessons Learned Diagram (Adapted from Lucidchart, n.d.)

The lessons learned through the process include a better understanding of the specific and unique needs that an elementary school has as an organization. Schools, especially elementary schools, have stakeholder groups that include students, parents, teachers, administrators, and members of the neighboring community. Each group carries specific needs, and special planning is required to ensure that the needs of all stakeholders are addressed. District policies also impact planning when implementing change in a public-school setting. Other lessons learned include understanding what is required to implement change, especially change that carries costs, at a school that receives finances from a district budget. Alternative financing methods may be required to implement a web-based dismissal service (e.g. PTA funding). Finally, lessons learned include a much better understanding, personally, of what is required to manage a sustainability-related change project using available tools and methodology.

Most processes have room for improvement. Understanding the process, and knowing what interventions may have an impact, are key when managing an improvement project. All recommendations made to GBEMS are intended to have a positive impact on the organization and its stakeholders. While this project is focused on one area of improvement, the tools and methodologies used can provide guidance to GBEMS when considering future improvement projects. Small, incremental improvements can ultimately have a big impact. As an elementary education institution, the future is literally in their hands.

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