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Analyzing the Extent to Which Pikesville High School Meets Sustainability Standards and Goals set by School District

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ABSTRACT

The intensifying consequences of global warming have recently led to an increase of sustainability assessment tools (SATs) and interest in sustainability testing within local communities, institutions, and schools. This paper analyzes whether Pikesville High school meets the sustainability goals and standards set by the overarching School System, which oversees thirty-eight high schools including this one. To measure this, a case study methodology, in cooperation with the University of California San Bernardino's High School Sustainability Assessment Questionnaire (HSSAQ), was used to determine whether the school is meeting requirements set by the county. Collection of data and completion of this survey by the researcher revealed that Pikesville High School is meeting sustainability standards and goals set by School System to a small extent, as only about one third (1/3) of quantifiable questions in the HSSAQ were answered "yes," meaning the school is meeting that specific sustainability standard. This data should enable the School System to continue sustainability research in the future, specifically in secondary schools throughout the school system.

Introduction

Sustainability is a complex and ongoing process which defies simple definition or categorization. According to the United Nations Brundtland Commission, the primary goal of sustainability is to satisfy the needs of the present "…without compromising the ability of future generations to meet their own needs" (*Sustainability | United Nations*, n.d.). In recent years especially, the topic of environmental sustainability has become increasingly popular as the effects of climate change and globally rising temperatures become more apparent. This has led me to wonder about the sustainability of one of the communities in which I spend much of my time – Pikesville High School – and allowed me to pose the question: to what extent does Pikesville High School meet sustainability standards and goals set by School System?

In this paper, I will be referring to the county which oversees Pikesville High School as "School System," to maintain anonymity and prevent any possible bias. In order to have a reference point from which to analyze the sustainability of this school, I will be using the High School Sustainability Assessment Questionnaire (HSSAQ), developed by the University of California San Bernardino. This is a fifteen-page questionnaire with both qualitative and quantitative questions that provides a comprehensive assessment of sustainability, including energy and water use, solid waste, teaching sustainability, and more.

To conduct this research, I will first compare School System's Policy Statement #3540 on Energy Conservation and Sustainability to the HSSAQ. This alignment will allow me to guarantee that I'm measuring sustainability from the perspective of the school system and not any other organization. I will then fill out the HSSAQ with data provided by School System administrators, teachers, custodial staff, and other employees. This two-step process will allow me to firstly assess the sustainability of Pikesville High School from a holistic standpoint, analyzing factors from a simultaneously environmental, social, and economic point-of-view, and secondly interpret these results in

terms of the larger School System community in order to gain a deeper understanding of how Pikesville High School uses resources, educates its students and faculty, and preserves its natural environment.

I initially hypothesized that Pikesville High School does not meet the required sustainability standards and goals set by the School System. I made this hypothesis based on my preexisting knowledge and experience at the school – from what I've seen, sustainability is not a priority. Factors including litter on school grounds, the common belief among students that the school doesn't recycle, and the general lack of discussion about sustainability by the administration all led me to this hypothesis that Pikesville would not meet sustainability goals if measured.

Before conducting this research, I assumed that I would be able to collect all the data I needed in order to answer every question in the HSSAQ. Even though I was looking to find very specific information on the school system that wasn't publicly accessible, I went into this study assuming that through strong communication with School System staff I would be able to collect all necessary data. The second assumption made was that all information provided to me would be completely accurate. Although I collected data exclusively from School System staff, I assumed that these staff members were giving me information that was 100% truthful, not just based on their personal beliefs.

Literature Review

Gap In Literature

The renewed interest of the global community in sustainability has prompted the creation of a new wave of Sustainability Assessment Tools (SATs). However, SATs, which can be defined as instruments that provide institutions with a systematic set of tools and procedures to measure their sustainability, have largely been developed for the use of Higher Education Institutions, known as HEIs (Findler et al., 2018, p. 2) There are many existing rating methodologies to assess the sustainability of universities and corporations, but there is a gap in the creation and availability of sustainability assessments for high schools. Specifically, there has been no research on Pikesville High School in terms of sustainability standards and goals set by School System. There are relatively few SATs that allow for the assessment of secondary education institutions, and even fewer available to individuals, specifically students, to analyze the sustainability of their school. This gap in pre-existing sustainability assessment tools is discussed in this literature review and explains how I chose the right SAT for my research.

Establishing Criteria Necessary for Sustainability Assessment Tools

In order to find the right SAT for Pikesville High School, I must first establish the basic principles which the assessment must contain. According to Michael Shriberg, who analyzes eleven cross-institutional assessment tools, there are five main objectives of an SAT: (1) to identify key issues, (2) to compare and benchmark against other organizations, (3) to go further than measuring environmental sustainability and also measure social and economic factors, (4) to identify processes and motivations, and (5) to be easily understandable and comprehensive (Shriberg, 2002, pgs. 155-156). In contrast, Robert B. Gibson, in his book *Impact Assessment and Project Appraisal*, cites that there are eight core criteria for sustainability assessments: the tool must be comprehensive and include social and economic perspectives, take precaution to address sustainability factors as complex and dynamic, encourage steps towards greater community and environmental sustainability, weave together corrective actions, recognize unalterable limits, only accept trade-offs as a last resort, location-specific, and include open-ended processes that always have the potential to evolve (Gibson, 2006, p. 172). When comparing these two works, the overlap demonstrates that a comprehensive assessment which goes further than measuring environmental sustainability along with identifying open-ended processes and motivations are the most important criterion for sustainability assessments to possess.

A holistic, comprehensive approach to measuring sustainability "effectively combines measures of incremental eco-efficiency (e.g., water conservation and recycling) with more long-term, sustainable processes (e.g., faculty training in sustainability, land stewardship practices, and the use of life-cycle assessment)" (Schriberg, 2002, p. 158). This method of examining multiple pillars of sustainability can be seen throughout the majority of successful SAT's, effectively characterizing it as one of the most critical aspects. This is corroborated through the University of Michigan's assessment of HEI's, which compared the strengths, weaknesses, and implications of eleven far-reaching and most-used SAT's. In identifying major strengths of these assessments, 5/11 of these had comprehensibility or a movement beyond eco-efficiency identified as a key strength. Out of the six assessment tools that did not mention comprehensibility as a major strength, 5/6 of these (83%) mentioned eco-efficiency without incorporation of other pillars of sustainability as a major weakness (Schriberg, 2002, p. 157). This illustrates that the inclusion of a broad range of sustainability perspectives is a determining factor in whether an SAT is successful.

As discussed by Finder et al. and Caeiro et al., there are various methodologies used to collect data on sustainability in institutions. Dalal-Clayton and Bass determine three main approaches to SAT's: Accounts, narrative, and indicators-based assessments (Finder et al. 2019, as cited in Dalal-Clayton and Bass, 2002). Accounts assessments are quantitative, drawing on data converted into a common unit (for example, price or energy). In contrast, narrative assessments are qualitative, allowing the researcher to develop a deeper understanding of people's personal experiences within their institution. Indicators-based assessments utilize both qualitative and quantitative methods to measure a specific aspect of sustainability and are therefore the most widely used and successful (Findler, 2019, p. 12). This type of data collection "…has the advantage of being potentially more transparent, consistent and comparable, thus useful for monitoring and decision support" (Caeiro et al. 2020). Therefore, seeing that indicators-based assessments will allow me to get the widest array of accurate data, ensuring the SAT I choose is an indicator-based assessment is necessary and must be established as a piece of criteria when choosing.

Evaluating Existing Sustainability Assessment Tools

Now having established that my SAT must be comprehensive, utilize an indicators-based methodology to collect both qualitative and quantitative data, and identify open-ended processes, there are several tools that meet these standards. One of the most renowned SAT's which meets these criteria is STARS (The Sustainability Tracking, Assessment & Rating System). This tool, open mainly to HEI's, is focused on a "broad and inclusive concept of sustainability", with focus on 17 impact areas which range from energy to waste to well-being & work (AASHE, 2020, p. 2). It utilizes indicators to develop an overall rating of sustainability with a point system, publishing the results on their website for comparison with other universities. While STARS would be the optimal tool to use to measure Pikesville High School's sustainability, it is not made specifically for high schools, nor is it available to the researcher as a student. Access to this reporting tool requires subscription with fees going greater than $1,500 for applicants who aren't members of the parent organization, AASHE. Therefore, STARS was deemed a very strong SAT but unavailable to the researcher. Similarly, the Times High Education Impact Rankings, UI GreenMetric World University Rankings, SAQ, and the National Wildlife Federation's State of the Campus Environment are all comprehensive, indicator-based SAT's that weren't chosen because they are either specifically for HEIs or require a necessary registration that I, as a student researcher, am not capable of (AASHE, 2020, p.1)

The main SATs found that were available and fit necessary criteria include the Maroochy Waterwatch Inc "Indicators for a sustainable school" and the High School Sustainability Assessment Questionnaire, known as the HSSAQ. The Maroochy Waterwatch framework, developed by Australian education and environmental agencies, is a rubric-like list that allows the researcher to score their school on a scale from exemplary – beginning. This tool is quantitative, with no space for researcher input or yes/no scores (Maroochy Waterwatch Inc., n.d.). In contrast, the HSSAQ – based on the SAQ, but formulated specifically for high schools – allows for both quantitative and qualitative data analysis. It contains yes/no questions with a range of options along with open-ended questions for the researcher to identify possible steps towards sustainability in their school. Furthermore, the HSSAQ is optimal because it contains

all necessary criteria, going into greater detail on topics such as transportation, food waste, and staff training on sustainability (Jacquot, 2003). Based on this review of existing sustainability assessments, the HSSAQ was the chosen tool to measure Pikesville High School sustainability.

Methodology

In order to collect, organize, and analyze data to answer a research question, a case study methodology was used. As stated by Crowe et al. in the BMC Medical Research Methodology journal, the case study is a widely used and acclaimed methodology that can "generate an in-depth, multi-faceted understanding of a complex issue in its real-life context" (Crowe et al., 2011). Consequently, this methodology was chosen to evaluate whether Pikesville High School meets environmental sustainability standards and goals set by the School System, and to what extent. A case study is the best approach to this research question because it allows the researcher to evaluate the process of sustainability at Pikesville High School not only on a deeper level, but to collect and analyze multiple perspectives on this subject, including the environmental, economic, and social perspectives.

One example of successful utilization of this methodology can be seen through STARS. Through this system, colleges and universities submit information pertaining to sustainability, after which STARS conducts a case study on each individual school. The schools subsequently receive a rating and score based on their overall sustainability. By providing this framework for sustainability tracking, STARS can analyze a plethora of factors that contribute to the sustainability of each school, conducting a complex review to gain a better understanding of the process of achieving sustainability at each school (AASHE, 2023). This methodology provided a framework for conducting research.

To perform a case study such as this at Pikesville High School, it was important to find a survey tool catered to my needs: it had to be accessible, indicators-based, conduct a holistic review, and be aligned with School System sustainability standards. Accessibility was the main consideration when choosing a survey method. The majority of sustainability surveys are designed for post-secondary school use, with questions engineered towards colleges and universities. Many survey tools also required membership and cost money to access. It was necessary for me to find a survey that was free, intended for secondary school use, and that I was able to fill out. This is the first necessary criterion for the sustainability assessment methodology tool I chose. Secondly, the survey tool had to analyze the concept of sustainability from a comprehensive point-of-view, going further than just environmental considerations and taking into account multiple perspectives on sustainability such as "…energy and water waste elimination, green purchasing, solid waste elimination, recycling, community outreach, student involvement, and sustainability education" (Jacquot, 2003, p. 3). Lastly, because my research question measures the sustainability of Pikesville High School in accordance with the guidelines set by the county, the survey methodology must encompass School System sustainability standards and goals.

These standards can be defined by the most recent School System Energy Conservation and Sustainability policy statement, seen in Figure 1. Released in August 2022, the statement describes guidelines that every school in the county must adhere to "…to the extent reasonable and practicable" (BCPS, 2022).

II. Standards

A. The Superintendent shall establish guidelines and strategies to promote sustainable practices and energy conversation, to the extent reasonable and practicable, in all school system operations, which shall include the following practices:

1. Addressing the purchasing, conservation, and efficiency of energy for BCPS.
2. Monitoring and Reporting of:
    a. The amount of electricity used from renewable energy sources;
    b. The percentage of the school system's annual electricity use that is from renewable energy sources; and
    c. Including current and historical data on the school system's use by source and square foot.
3. All future replacement and/or new school construction projects shall be considered by a maximum LEED.
4. Continuing the development and implementation of conservation plans and environmentally conscious practices.

B. In accordance with State law, the Board's energy policy shall be:

1. Posted on the school system's Web site; and
2. Reviewed every three (3) years.

Figure 1. *School System Policy #3540 on Energy Conservation and Sustainability*

The principal standards discussed in this policy statement include monitoring the amount of renewable energy used, considering construction projects by a maximum LEED (adhering to sustainable prerequisites when constructing new facilities), and the continuous implementation of environmentally conscious practices.

After searching the larger body of literature for a sustainability measurement tool that met these criteria, I decided on the High School Sustainability Assessment Questionnaire, also known as the HSSAQ. This comprehensive sustainability assessment tool was taken from the University of California San Bernardino's publication titled "The sustainable school: A sustainability assessment questionnaire for high schools", the goal of which was to create a free survey tool that high school students could use – in collaboration with their school staff – to assess the sustainability of their schools. The questionnaire is fifteen pages long with three sections and various subsections, including both qualitative, yes-no questions and quantitative questions asking for specific values used to measure sustainability. It also includes five questions which question the research team on various methods that could be used in the future to further sustainability efforts. The HSSAQ was deemed the best tool to conduct a case study on Pikesville because it was accessible, indicators-based, designed for secondary school use, and featured questions on economic, social, and environmental factors that allowed me to get a deeper, multi-faceted understanding of sustainability and the processes that contribute to in at this specific high school. It also includes questions that address concerns similar to those expressed by the School System, meaning it would be an accurate measurement tool to see if Pikesville High school is meeting sustainability standards set by the county.

To gather information to fill out the HSSAQ, data was collected both virtually through email, and in-person through face-to-face discussions. Information was gathered from different sources within the school system and the wider School System range of resources, including Pikesville High School's custodial and cafeteria staff, administrators, and analysts from the School System department of Energy & Sustainability. Specifically, much of the data was collected from the School System Department of Energy & Sustainability data analysts. By emailing this staff specific survey questions in the HSSAQ, I was able to then collect answers supported by School System data. Once information

was received, I immediately categorized it according to the sections in the HSSAQ. These sections are: (1), Buildings and Operations for Sustainability, (2) Administration and management for Sustainability, and (3), Education for Sustainability. I then answered the question, answering it "yes" if Pikesville High School is meeting that specific sustainability standard, "no" if the school is not meeting that specific standard, and "somewhat" if the answer is in the middle. After a section was fully completed, I calculated the total questions answered yes and no, which told me if was meeting this set of standards and goals set by the county. To ensure that all the data I collected was completely accurate, I collected it exclusively from School System staff and data analysts from the Department of Energy and Sustainability who were knowledgeable about specific sustainability practices at Pikesville High School

In this study, the independent variable is the things that Pikesville High School does (or doesn't do) to be environmentally sustainable, and the dependent variable is how the school is scored– in terms of sustainability – based on this assessment tool and if it complies with School System sustainability standards.

Results

Results have been split up into three sections based on the arrangement of the questionnaire. Within each portion, there are subsections which expand on a certain aspect of that section. Each subsection was thematically coded in order to identify key themes and ideas without needing to discuss every question in the HSSAQ. Results of that section are displayed in the subsequent chart, and total results of that section are then discussed.

Section 1: Buildings and Operations for Sustainability

Section one was the largest by far, with forty questions focused on the environmental and economic facets of sustainability. Most of this information was provided by School System data analysts. However, information was also collected from custodial and cafeteria staff, and even art teachers. Along with the forty quantifiable questions used to measure sustainability, there were also an additional five extension questions meant for students and school staff to brainstorm measures that could be implemented to help further sustainability efforts at the school.

When totaling the results of this section, it's clear that Pikesville High School is not meeting sustainability standards. Only 12/40 questions were answered "yes," meaning the school is only meeting 30% of sustainability goals in terms of buildings and operations. Most of the questions – 19/40 or 47.5% – were answered no, 1/40 (0.025%) was answered "somewhat," and a sizeable portion (8/40 or 20%) of questions were left unanswered, either because they were dependent on the previous question being answered "yes" or because I was unable to collect data on that specific sustainability policy at the school. Of these eight unanswered questions, five asked the researcher to collect qualitative data, but were not answered due to dependency on the previous question.

Table 1. *HSSAQ Results from Section 1: Buildings and Operations for Sustainability*

Subsection	1.1: Solid Waste	1.2/1.3: Environmental Hazards	1.4: Energy Management	1.5: Water Waste Elimination	1.7: Purchasing for Sustainability
Codes	Cost, recycling, strategies to reduce waste	Non-toxic supplies, radon, ventilation, non-hazardous building materials	Cost, transportation, energy saving lamps/time clocks	Water leaks, reclaiming water, low use, educational experiences	Organic and locally sourced food, recycled paper, coordinator
Total number of questions	9	10	8	9	4
Questions answered "yes", sustainable	1	7	2	1	1
Questions answered "no", not sustainable	4	3	4	6	2
Questions answered "somewhat"	-	-	-	-	1
Questions unanswered	4	-	2	2	-

Section 2: Administration and Management for Sustainability

The second section of the HSSAQ was the smallest, with only twelve questions based on administrative action towards sustainability. Information on this section was provided partially by school staff and partially by the school website or found in the school mission statement.

Overall, only one question (8.33% of this entire survey section) was answered yes, meaning in terms of administration and management for sustainability, Pikesville High School is severely lacking. The vast majority of questions (10/12, or 83.33%) were answered no, illustrating that the school could be doing much more in terms of incorporating sustainability into the school plan, system, and curriculum. Lastly, one question was answered "somewhat," which is another 8.33% of this survey section.

Table 2. *HSSAQ Results from Section 2: Administration and Management for Sustainability*

Subsection	2.1: Relation between Overall School Plan and School Sustainability Plan	2.2: School Sustainability Plan	2.3: Modeling and Teaching Sustainability through Management and Administration
Codes	Mission statement, school plan	Team approach, comprehensive school plan, sustainability coordinator, publicity	Classroom curriculum, student population, contribute ideas
Total number of questions	2	8	2
Questions answered "yes," sustainable	-	1	-
Questions answered "no," not sustainable	2	6	2
Questions answered "somewhat"	-	1	-
Questions unanswered	-	-	-

Section 3: Education for Sustainability

This section was composed of eighteen questions, most of which were about school curriculum and teaching of sustainability. Data for this section was provided by various members of the Science Department at Pikesville High School. There are three subsections within this portion of the HSSAQ, with each subsection being coded so themes can be easily pulled out and understood.

When synthesizing information from all three subsections, data shows that 9/18 or 50% of questions were answered "yes," demonstrating that education of sustainability for students and faculty is leaning towards being a sustainable practice at this school. In contrast to the other sections, only 8/18 or 44.4% of questions were answered "no," with 1 (0.056%) being answered "somewhat". This shows that in terms of teaching sustainability, Pikesville is meeting standards and goals set by the county.

Summary

Out of a total of seventy quantifiable survey questions (along with five questions intended for further brainstorming and discussion), a majority of thirty-seven questions or 52.9% were answered "no," meaning Pikesville High School is not doing anything to meet 52.9% of sustainability standards or goals set by the larger County. Only twenty-two of these quantifiable questions, or 31.4%, were answered "yes". For two questions (4.3%), Pikesville High School scored in the middle, and eight questions (11.4%) were left unanswered, either due to being dependent on the previous question being answered "yes" or because insufficient information was collected to answer them.

Table 3. *HSSAQ Results from Section 3: Education for Sustainability*

Subsection	3.1 / 3.2: Sustainability Education for Students	3.3: Sustainability Education for Teachers	3.4: Sustainability Education for Staff
Codes	Student involvement, student and alumni evaluation, extracurricular club, school curriculum, local community	Money allocated, familiarity with sustainability, hiring, teacher in-service programs	Training sessions, actively involved
Total number of questions	12	3	3
Questions answered "yes," sustainable	5	2	2
Questions answered "no," not sustainable	6	1	1
Questions answered "somewhat"	1	-	-
Questions unanswered	-	-	-

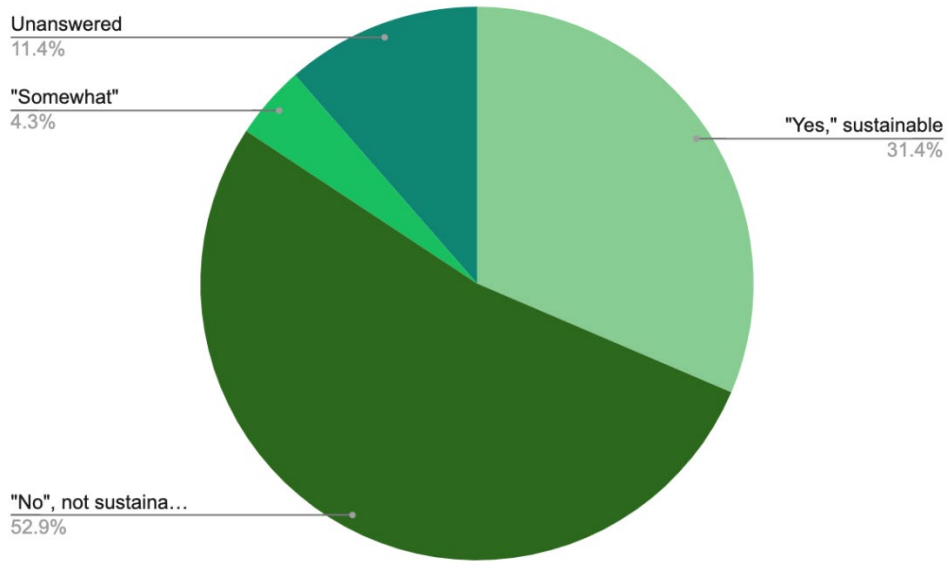

Figure 2. *Complete Survey Results of the HSSAQ*

Conclusion

With this data, I can firmly answer my research question and state that Pikesville High School is only meeting sustainability standards and goals set by School System to a small extent. This contrasts with my initial hypothesis, which was that the school would not meet sustainability guidelines set by the county at all. Instead, my research has proven that these standards and goals are being met to a small extent, as illustrated in Figure 2 (see above), where it's clear that less than 1/3 of questions in the HSSAQ were answered as "yes," or meeting that specific sustainability standard. Section 2: Administration and Management for Sustainability was especially telling, as 83.33% of questions in this section were answered "no," not meeting sustainability goals. This demonstrates that the Pikesville High School administration is not doing enough to incorporate the concept of sustainability into the curriculum and overall school plan. This leads me to assume that it is not students who are contributing to the overall lack of sustainability at this school, but rather the administration. In the future, research could be focused on evaluating the role of school administration in sustainability plan creation and implementation.

Discussion

Going back to my initial assumptions, the first assumption I made – that I would be able to collect data to answer every quantifiable question in the HSSAQ – was inaccurate. As demonstrated in the results, there were eight questions, all found in section 1: Buildings and Operations and Sustainability, that had to be left unanswered. However, only two of these were unanswered due to lack of sufficient data, the rest being dependent on the previous question being answered as "yes". This lack of data is definitely a limitation of my research, because my survey could have been more accurate had this information had been accessible to me. However, these two questions left unanswered are not enough to have significantly changed the results of the survey.

The second assumption made, that all information provided to me was accurate, proved correct. This can be ensured because the majority of my data was collected from analysts in the School System department of Energy and Sustainability. Not only are these analysts entitled to provide accurate information about the school system, but they also sent me links and/or referred me to other specialists that could affirm their information was accurate. This confirmed that all data I collected was fully accurate and unbiased.

Limitations

The main limitations of this research were present when searching for a survey tool. As discussed in the methodology, it was necessary to find a survey tool that was accessible, indicators-based, intended for high school use, comprehensive, and most importantly, aligned with School System sustainability standards. This made the pool of options much more limited when selecting a survey, and it meant that I couldn't use a tool that was more peer-reviewed or renowned for its sustainability benchmarking (for example, the STARS rating methodology). Another limitation present is the two questions left unanswered due to lack of sufficient data – this prevented me from completing the whole HSSAQ and getting a completely accurate reading of the sustainability of Pikesville High School. However, these two questions are not enough to significantly change the results of the survey or alter my conclusion.

Lastly, an important limitation to note is the absence of qualitative data analysis. There were five questions in Section 1 of the HSSAQ which requested qualitative data (for example, gallons of water saved or energy cost per square foot), all of which were unanswered due to a dependency on the previous question being answered "yes". This qualitative data would have been insightful to collect and analyze. However, the fact that these questions were left unanswered is equally insightful and demonstrates how Pikesville High School is not collecting important data on Buildings and Operations or taking every possible step towards sustainability.

Implications

Despite these limitations, this research has ominous implications for the larger School System. If one high school is only meeting sustainability standards and goals set to a small extent, there is a good chance that other high schools throughout the county would similarly be neglecting to meet sustainability guidelines. This has negative implications for the larger Pikesville-area community, as a low sustainability score on the HSSAQ means that the school is not preserving the natural environment and cultivating a social environment based on climate awareness as well as it could be. The school system should use this new information and awareness of the sustainability of Pikesville High School as a steppingstone towards conducting further research on high school sustainability within the school system. This research could also be expanded to include all pre-kindergarten, elementary, and middle school data to get an accurate understanding of how individual schools implement county-regulated sustainability practices.

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