



## WHITE PAPER SERIES

### **Student Assessment of Campus Facilities Spring 2019**

Decision Support and  
Institutional Research

## About the Authors

**Dr. Andrew L. Luna**, is Executive Director of Decision Support and Institutional Research. He has served over 30 years in higher education, with over 20 of those years in institutional research. He has published research studies on many topics including salary studies, assessment, market research, and quality improvement. Dr. Luna received his Ph.D. and M.A. degrees in higher education administration and his M.A. and B.A. degrees in journalism, all from the University of Alabama.

**Emmanuel C. Kanu** is a Graduate Teaching Assistant at APSU who is majoring in Predictive Analytics. He has a B.S. in Geology from University of Ilorin, Nigeria. He has 15 years of experience in the Oil and Gas Industry prior to coming to the USA for his M.S. in Computer Science and Quantitative Methods. Mr. Kanu participated in the analysis and writing of this study as part of the fulfilment of his masters program.

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### EXECUTIVE SUMMARY

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During the spring 2019 semester, the Physical Plant Department engaged the assistance of the office of Decision Support and Institutional Research to develop, administer, and analyze a survey to determine how students at Austin Peay State University perceive the overall campus infrastructure. A 10-item survey was sent to all enrolled students during the spring 2019 semester (n = 9,703). The survey was developed in Qualtrics and a link to the survey was embedded in an email that was sent campus-wide. A total of 364 students responded to the survey for a total response rate of about 4%.

The survey consisted of four major categories of Classrooms and Labs, Library, Student Services, and Environmental factors. Each category contained multiple questions or attributes where the respondent had to indicate both the level of importance and satisfaction. Performance gaps were computed by subtracting the satisfaction score from the importance score of each attribute. These scores were then averaged and placed on a radar graph to visually display where larger performance gaps existed.

Overall results indicated that:

Where both the importance and satisfaction measures contained a 7-point scale, performance gaps (where student expectations are not being met) could be high as 6 (7-1). In this study, most performance gaps were less than 1.

The category where student expectations were closest to being met was the Student Services area where average scores indicated that both indoor and outdoor campus recreation facilities were adequate.

The category where student expectations were least met was the Environmental Factors area, where average scores indicated that students were somewhat concerned over safety and security of campus parking areas as well as the safety and security of campus grounds. Although this area demonstrated where student expectations were least met, the highest performance gap within the study of 1.5 out of a possible 6 indicates that student concern is not significant.

### INTRODUCTION

The dynamic state of the economy, whether global, national, or in our immediate communities indicates the importance of higher education, which becomes even more vital. The main goal of any higher education institution is to sustain a learning environment that can understand and deal appropriately with itself and the rest of the world (McGowen, 2007).

The achievement of that goal cannot be possible without efficiency and effectiveness in the provision of services by the higher education institution. Most institutions strive to achieve efficiency and effectiveness in their services by investing wisely in facilities, human resources, education systems, and students. One of the most important resources in which a university invests heavily is the facilities that make up the physical characteristics of the institution. (Vidalakis et al., 2013).

Apart from investing in facilities to upgrade the quality of the academic services provided, universities also invest in those facilities to meet the academic needs of the students and make their experience at the institution worthwhile. An institution's facilities are one of the important elements that must be present to ensure that students are satisfied and have the academic services necessary. Thus, the relationship between academic facilities and student satisfaction cannot be overlooked (Gruber et al., 2010).

The quality of higher education is affected by many factors. Understanding these factors enables institutions of higher education to continuously improve and strengthen themselves; otherwise, they would cease to be centers of academic excellence (Mpaata, 2010). These factors, in one way or another, relate with and can be influenced by the availability of efficient academic facilities. Campus facilities influence the promotion of quality education in higher education institutions in the following ways according to Daigneau (2006);

**Providing a physical environment that supports educational processes (Daigneau, 2006).** The way academic facilities have been organized and established provides the infrastructure for the academic process to take place. Better academic facilities lead to improvement of the educational process and of the overall quality of the institution.

*“Apart from investing in facilities to upgrade the quality of the academic services provided, universities also invest in those facilities to meet the academic needs of students...”*

**Establishing a visual statement about the quality and capability of the institution.** When anyone visits any higher education institution, the first thing to notice and use as the measuring gauge for quality and capability of the institution is the available academic facilities. The design of a college or university's physical environment reflects an institution's goals and values. The way facilities have been given priority and value reflects the extent to which the particular higher education institution values the quality of its educational offerings. Clearly, facilities influence the functions of the particular institution (Daigneau, 2006). Hence, it can be said that academic facilities are essential for marketing, as they advertise the quality of the education at the institution (Daigneau, 2006).

**Creation of an academic community.** All the important stakeholders of the institution, that is, students and academic staff, exist around and within the academic facilities, forming a community that is academic-oriented. Therefore, academic facilities make it possible to have the academic community that is vital for the quality of education at the institution (Shaarmelau, 2015).

Facilities are an essential component of an education organization because they make a great contribution to important aspects such as creating comprehensive curriculum/scholarly resources, supporting faculty, fostering exceptional and motivated students, and directly influencing the promotion of quality education within institutions.

A growing body of research has found that school facilities can have a profound impact on both teacher and student outcomes. With respect to teachers, school facilities affect teacher recruitment, retention, commitment, and effort. With respect to students, school facilities affect health, behavior, engagement, learning, and growth in achievement. Thus, researchers generally conclude that without adequate facilities and resources, it is extremely difficult to serve large numbers of students with complex needs.

According to the US General Accounting Office (GAO) almost three-fourths of existing US schools in 1996 were constructed before 1970. Of these schools, about one-third of schools had

*“Campus facilities influence the promotion of quality education in higher education institutions...”*

need of extensive repair or replacement and almost two-thirds had at least one inadequate building feature such as substandard plumbing, roofing, or electrical systems. Moreover, 58% had at least one unsatisfactory environmental condition such as inadequate ventilation, acoustics, or physical security.

Besides general maintenance and construction issues, researchers have found most schools lack 21st century facilities in the form of infrastructure, laboratories, and instructional space. More than half do not have sufficiently flexible instructional space for effective teaching to take place.

There are five primary facets of school facilities: acoustics/noise, air quality, lighting, temperature, and space. These are addressed below.

### *Acoustics and Noise*

Noise levels greatly affect teacher and student performance. In fact, excessive noise causes dissatisfaction and stress in both teachers and students. Research has found that schools that have classrooms with less external noise are positively associated with greater student engagement and achievement compared to schools with classrooms that have noisier environments. Thus, building schools that buffer external noise from classrooms can improve student outcomes (Buckley, J., Schneider, M., & Shang, Y. 2004).

### *Air Quality*

Indoor air quality is also a concern because poor air quality is a major contributor to absenteeism for students with asthma. Research also indicates that many schools suffer from “sick building syndrome” which affects the absenteeism and performance of all students. Moreover, bacteria, viruses, and allergens that contribute to childhood disease are commonly found in schools with poor ventilation systems.

Indoor pollutants are also emitted from office equipment, flooring materials, paints, adhesives, cleaning products, pesticides, and insects. All of these environmental hazards can negatively affect children, particularly in schools with poor ventilation systems (Mendell, M. J., & Heath, G. A. 2005). Air quality is mechanically measured by Physical Plant and is not part of this survey.

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### *Lighting*

Before the advent of cheap electricity, schools often relied on natural lighting. As electric power costs declined, the amount of artificial light used in schools increased. Research has shown that artificial lighting has negative impacts on those in schools while natural lighting has positive impacts. In fact, research has shown that not only does classroom lighting boost the morale of teachers and students, appropriate amounts of natural lighting also reduce off-task behavior and improve test scores. One study found that students with the most exposure to natural daylight progressed 20% faster in math and 26% faster in reading than students who were taught in environments with the least amount of natural light (Hathaway, W.E. 1995).

### *Proper Temperature and Control of Temperature*

One consistent research finding across individuals of all ages is that the temperature in which a person works affects engagement levels and overall productivity—including student achievement. Anyone that has worked in a classroom or office that is too hot or too cold knows how difficult it can be to be productive when the temperature is uncomfortable. According to the best analyses, the ideal temperature range for effective learning in reading and mathematics is between 68 F° and 74 F°.

To maintain such a temperature in every classroom within a school, teachers typically need to be able to control the temperature in their own classroom. At the very least, teachers should be able to control the temperature of small blocks of classrooms that receive the same amount of sunlight and have similar exposures to outside temperatures (Wargocki, P., & Wyon, D. P. 2007).

### *Classroom Size and Space*

Overcrowded classrooms have consistently been linked to increased levels of aggression in students. Overcrowded classrooms are also associated with decreased levels of student engagement, such that decreased levels of learning occur (Ready, D., Lee, V., & Welner, K. 2004).

Alternatively, classrooms with ample space are more conducive to providing appropriate learning environments for students and

*“There are five primary facets of school facilities: acoustics/ noise, air quality, lighting, temperature, and space...”*



associated with increased student engagement and learning. Classroom space is particularly relevant with the current emphasis on ensuring students can work in teams, problem solve, and communicate effectively. Classrooms with adequate space to reconfigure seating arrangements facilitate the use of different teaching methods that are aligned to these 21st century skills. The creation of private study areas as well as smaller learning centers reduces visual and auditory interruptions and is positively related to student development and achievement (Ready, D., Lee, V., & Welner, K. 2004).

### *The Impact of Facilities*

Improving the quality of school facilities is an expensive undertaking. However, when the positive impacts of facility improvement on teachers and students are translated into dollar figures, the rewards of such investments far outstrip the cost of the investments.

To justify operational expenses, there is a need for accountability by various segments and departments within APSU and institutions of higher education in general. This accountability varies broadly by legislative bodies, governors' offices, accreditors, faculty committees, federal mandates, students and other constituencies. One of the pillars of accountability is the assessment of quality.

### *Students' satisfaction*

Gbadosami & De Jager (2010) maintain that measuring and assuring the quality of services provided by such important stakeholders as students, staff, and employers is of key importance for universities. Students' satisfaction with their educational experience, like customer satisfaction, is the result of a complex set of factors. Understanding what those factors are and how they combine to influence satisfaction is critical to educators who believe that student satisfaction in addition to learning is a desired outcome of their efforts (Shaatzmelau, R. 2015).

The quality of service is a forerunner to satisfaction. Therefore, a proper understanding of the antecedents and determinants of clients' satisfaction can be seen to have an extraordinarily high monetary value for service organization in a competitive environment (Hanaysha et al, 2011). McDougall and Levesque (2000)

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defined customer satisfaction as “a cognitive or affective reaction that emerges in response to a single or prolonged set of service encounters.” Kotler et al. (2009, p.120) define satisfaction as “a person’s feeling of pleasure that result from comparing a product’s perceived performance (or outcome) to their expectation.” It means that if the performance matches the expectation, the customer will be satisfied. The level of satisfaction is a function of the difference between perception and expectation. Consumer satisfaction has been typically conceptualized as either an emotional (Cadotte et al., 1987) or cognitive response (Giese & Cote, 2002). This means that, at one point, satisfaction can be categorized based on whether it has either emotional or mental origin. In the context of higher education, the matter of satisfaction is what students expect from their educational institution.

The purpose of the current study is to measure the gap between the perceptions and expectations of users of service facilities as a form of evaluation of the performance of the university, which can be used in quality improvement. As part of this cross-sectional study, a survey concerning student attitudes about facilities was administered at Austin Peay State University. This email survey was distributed to both undergraduate and graduate students enrolled in the spring semester of 2019. The objective was to determine students’ level of satisfaction in the facilities so that administrators can better prioritize physical projects. In using assessment tools like the one in this study, administrators can better gauge the level of student satisfaction with an institution’s facilities, in order to maintain both student satisfaction and accountability. The survey will help administrators at APSU know how students perceive campus facilities: if they are satisfied or not, as well as the level of importance students place on various attributes within campus facilities; the electronic survey instrument used in this study measured students’ ratings of importance and satisfaction with respect to key indicators concerning APSU facilities. The objectives of the study were the following:

1. To observe the relationship between the importance that students place on campus facilities and their level of satisfaction with those facilities.
2. To determine the level of expectation students have concerning the quality and availability of campus facilities at APSU.
3. To determine opportunities for improvement using performance gaps developed within the survey instrument.

### METHODOLOGY

To determine the level of importance students placed on key attributes within APSU's campus facilities, as well as how satisfied they were with these attributes, a 10-item electronic questionnaire was developed and sent to all students who were enrolled during the spring 2019 semester. From these data, simple frequency distributions were run and performance gaps computed on selected questions. It was determined that no further statistical analysis would be needed.

While the use of statistical methodologies supports scientific objectivity, their complexity often makes them difficult to understand by the end user. Other studies have also indicated that these types of methodologies inherently contain statistical error due to the additive and multiplicative attributes of the procedures used (McLaughlin & McLaughlin, 2007). Therefore, it is recommended that the institution not rely solely on the outcome of a statistical methodology. Rather, the data from the analysis should be used in conjunction with other knowledge gained (Luna, 1997).

In analyzing the data collected, the SAS programming language was used for basic data analysis and coding, and Excel was used for the charts and interpretation of the data. Data presentation was done with the aid of radar charts.

Four major academic facility categories were assigned in the online questionnaire-based survey, with individual questions to determine the level of Importance and Satisfaction of the students with the category. These categories are:

1. Classroom and Laboratory
2. Library
3. Student Services
4. Environmental (Safety and Security)

Performance gap analysis helps a business identify how far it has come toward reaching its goals and how far it still needs to go to attain them, with the objective of developing a concrete strategy to close any existing gap. Performance gap analysis is a somewhat simplistic measure to show the relationship of how satisfied a respondent is with a particular attribute in relation to how important the respondent believes that same attribute to be. Specifically, the performance gap is a measure of the mathematical difference between the importance and performance

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measure for a particular attribute. Large gaps indicate where respondent expectations are least met (Luna. A, 1987). This can be seen in the radar charts. The validation from students on each facility will determine if the performance gap should be a concern and be bridge. For each attribute, the respondent was asked to rate both the importance and satisfaction with regard to the academic facilities.

### Radar Chart

A 7-point Likert-type scale was used for both measures of importance and performance. Mean values for both scales were calculated and grouped by category. The importance measure for each issue was then compared to the performance (satisfaction) measure for that same issue. These comparisons were used to develop a performance gap analysis. The design of the instrument was based, in part, on the Importance-Performance Model (Sethna, 1982; Kotler & Fox, 1985; Polcyn, 1986; Luna, 1997; and Martilla & James, 1977).

A scale of 1=Low and 7=High was assigned to each of the sub-query in the questionnaire-based survey.

A radar graph is laid out in a circular fashion, rather than the more common linear arrangement, and consists of axis lines that start in the center of a circle and extend to its periphery. These graphs are mainly used to measure the relationship of two variables on a single attribute. In this case, the variable consists of the grouped means of importance and satisfaction for each attribute within each of the categories. Each radar graph represents one of the four categories within the survey, and each axis within a given graph represents one of the attributes within that category. The axes are arranged to begin in the center of the graph and extend toward the outside, increasing in value. The means of each variable as it relates to a particular attribute are plotted on the axis of that attribute.

The red line going across each axis represents the measure of importance and the blue line represents the measure of satisfaction. The lines of importance and satisfaction are plotted on each axis to correspond to the grouped mean for each measure. From this graph, three environments may exist. An environment where the red and blue lines are touching, or are very close to each other, indicates that respondent demand is being met, no matter how low or high that demand may be. When the

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red mean is higher than the blue mean, a gap exists indicating an environment where the respondent demand is lacking. The larger the gap, the less respondent demand is being met. When the measures are reversed and the blue mean is greater than the red mean, another type of gap existed indicating an environment where respondent demand has been exceeded. A very large gap of this nature could signal overkill, where the attribute is performing at a higher rate than the respondent expected or desired.

RESULTS

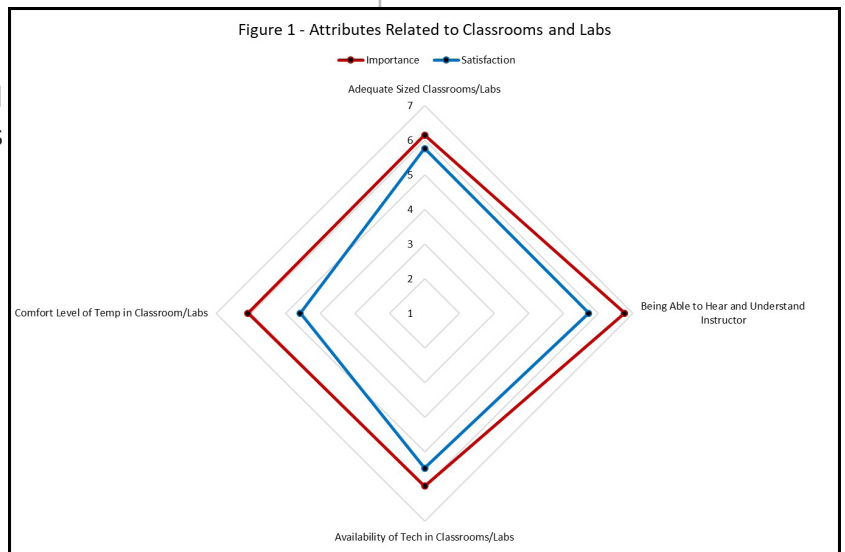
The 10-item survey was sent to all enrolled students during the spring 2019 semester (n = 9,703). The survey was developed in Qualtrics and a link to the survey was embedded in an email that was sent campus-wide. A total of 364 students responded to the survey for a total response rate of about 4%. Students who answered less than half of the survey were removed and were not counted in the final results or the response rate.

Each of the four categories of Classrooms and Labs, Library, Student Services, and Environmental contained multiple questions or attributes where the respondent had to indicate both the level of importance and satisfaction. Performance gaps were computed by subtracting the satisfaction score from the importance score of each attribute. These scores were then averaged and placed on a radar graph to visually display where larger performance gaps existed.

Within the category of Classrooms and Laboratories, respondents were asked about size adequacy of classrooms, availability of technology in the classrooms, comfort level within the classrooms,

and whether students could hear and understand the instructor. Within this category, respondents indicated both a high level of importance and satisfaction on all four attributes (Figure 1). Considering that the maximum level of performance gap could be a 6, gaps of less than 2 are considered relatively small.

The largest performance gaps occurred with the comfort level of the classroom as well as the students' ability to hear and understand the instructor. The smallest performance gaps existed for adequately sized classrooms as well as the availability of technology in the classroom. Here the gaps were less than 1, indicating that student expectations are close to being met. The larger performance gaps were corroborated by the open-ended responses



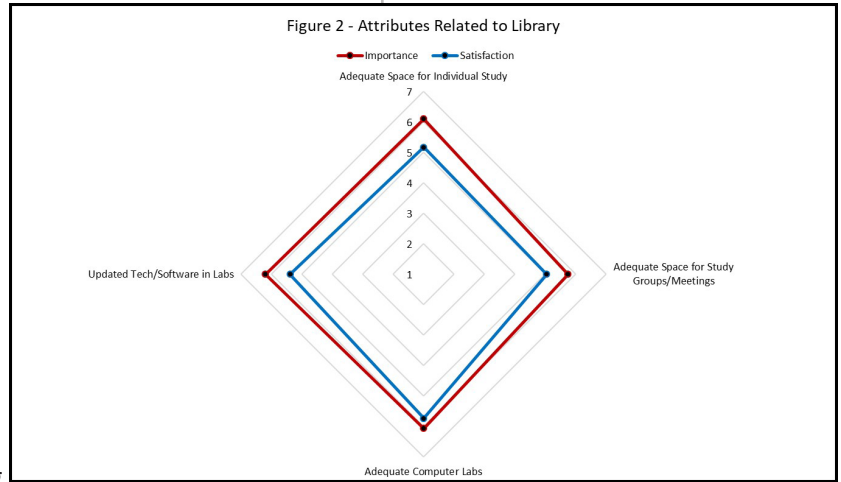
Attributes Related to Classrooms and Laboratories			
Attributes	Importance	Satisfaction	Gap
Adequate Sized Classrooms/Labs	6.14	5.75	0.39
Being Able to Hear and Understand Instructor	6.76	5.73	1.03
Availability of Tech in Classrooms/Labs	5.99	5.47	0.52
Comfort Level of Temp in Classroom/Labs	6.09	4.58	1.51

to the survey. Here, many of the respondents indicated that the classrooms were either too hot or too cold.

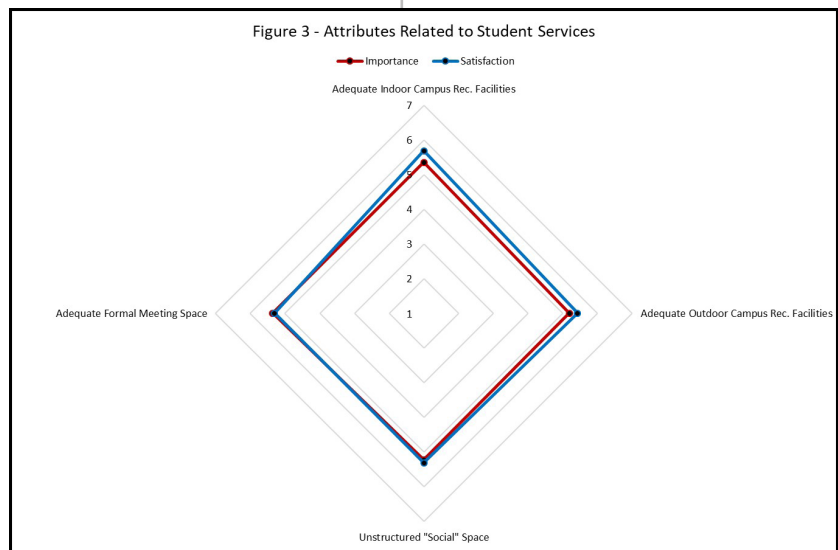
Within the category of the Library, respondents were asked about size adequacy of space for individual study, updated technology/software in the laboratories, adequacy of space for group meetings/study, and adequacy of computer labs. Within this category, respondents indicated both a high level of importance and satisfaction on all four attributes (**Figure 2**). In all cases, the performance gap was less than 1, indicating small gaps between expectations and performance.

The largest performance gaps occurred with "adequacy of space for individual study" and "updated technology/software in laboratories." The smallest performance gaps existed for "adequacy of space for group meetings/study" and "adequacy of computer laboratories." Here the gaps were less than 1, indicating that student expectations are close to being met.

Within the category of the Student Services, respondents were asked about size adequacy of space for formal meetings, adequacy of unstructured "social" space, adequacy of outdoor campus recreation facilities, and adequacy of indoor recreation facilities. Within this category, respondents indicated both a high level of importance and satisfaction on all four attributes (**Figure 3**). In all cases, the performance gap was less than 1, indicating small gaps between expectations and performance. It should be noted that this grouping contained smaller gaps than the other three



Attributes	Importance	Satisfaction	Gap
Adequate Space for Individual Study	6.1	5.17	0.93
Adequate Space for Study Groups/Meetings	5.74	5.04	0.7
Adequate Computer Labs	6.06	5.73	0.33
Updated Tech/Software in Labs	6.2	5.39	0.81



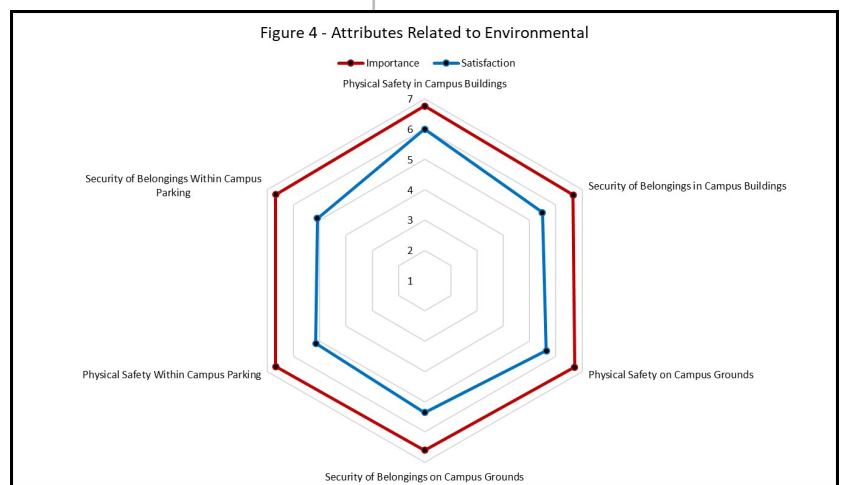
Attributes	Importance	Satisfaction	Gap
Adequate Indoor Campus Rec. Facilities	5.35	5.68	-0.33
Adequate Outdoor Campus Rec. Facilities	5.19	5.42	-0.23
Unstructured "Social" Space	5.22	5.31	-0.09
Adequate Formal Meeting Space	5.35	5.3	0.05

groupings, indicating that student need was closer to being met.

The largest performance gap occurred with adequacy of formal meeting space. Here, there was only a half a point difference between importance and satisfaction. The other areas within Student Services had negative performance gaps, indicating that average student satisfaction with indoor and outdoor recreation facilities as well as adequacy of social meeting space was higher than importance. In cases where there are large negative performance gaps, the level of satisfaction with an attribute will be significantly higher than the importance measure. Higher negative gaps could indicate a state of "overkill" or heavy emphasis by the administration over an attribute which students believe is not that important.

Within the category of the Environmental Factors, respondents were asked about physical safety within campus buildings, on campus grounds, and within campus parking. They were also asked about security within campus buildings, on campus grounds, and within campus parking. Within this category, respondents indicated both a high level of importance and satisfaction on all six attributes (**Figure 4**). In all cases except one, performance gaps were higher than one, indicating that, on average, student expectations regarding campus safety and security were being less met than the other three groupings.

The largest performance gaps were in both the safety and security of campus parking. These were the largest gaps found in the study with a 1.53 and 1.58 respectively. Safety and security within campus buildings saw the lowest performance gaps followed by safety and security on campus grounds.



Attributes	Importance	Satisfaction	Gap
Physical Safety in Campus Buildings	6.76	5.99	0.77
Security of Belongings in Campus Buildings	6.66	5.48	1.18
Physical Safety on Campus Grounds	6.71	5.64	1.07
Security of Belongings on Campus Grounds	6.6	5.35	1.25
Physical Safety Within Campus Parking	6.68	5.15	1.53
Security of Belongings Within Campus Parking	6.68	5.1	1.58



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### CONCLUSION

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The Performance Gap analyses, as shown from the radar charts, give insight into areas that do not meet student expectations and need improvement. Clearly, the larger the gap, the less student expectations are being met. When setting priorities, facilities administrators should focus on those areas where the performance gaps are greater. Within this study, each measure of importance and satisfaction carried with it a scale of 1 - 7 where the higher number indicated greater importance/satisfaction. In extreme instances, performance gaps of 6 (7-1) could occur if a student believes an attribute was very important yet was extremely unsatisfied with that attribute. Given the fact that the largest performance gap within the APSU Facilities Survey was only 1.58, it can be assumed that most students were relatively satisfied with campus facilities.

The smallest performance gaps occurred within the Student Services area while the largest gaps occurred within the Environmental Factors, specifically safety and security with respect to parking and being outside on campus grounds. It is recommended that the institution concentrate its efforts on diminishing the gap within these areas. This could be accomplished utilizing both physical (increased lighting, greater patrolling) and educational resources (active and passive programs on campus safety).

It is also recommended that this survey be administered every other year to see where the institution has improved, to examine where gaps have increased, and to develop trend data.

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