



Improving Commute Time Within Campus for Kean University Students
Research Project

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1. Problem Definition

The subjects of focus in this research are Kean University students. Kean University is a public post-secondary institution in New Jersey. It is known for its outstanding achievements and forward-thinking approach in the realm of higher education, specifically within the domains of business, healthcare, and technology. Its six undergraduate colleges, which include the College of Business and Public Management, the College of Education, the College of Liberal Arts, the Dorothy and George Hennings College of Science, Mathematics and Technology, Michael Graves College, and the New Jersey Center for Science, Technology, and Mathematics, collectively provide a diverse selection of over 50 undergraduate degree programs across a wide spectrum of academic disciplines. Likewise, Kean offers six doctoral degree programs and more than seventy options for graduate study leading to master's degrees, professional diplomas, or certifications.

Kean University is concerned about the rise in students' lateness, as reported by faculty members. The observable symptom is an increasing number of students arriving late to their classes. The underlying problem causing this observational symptom is the insufficient time for students to commute from one building to another during their scheduled classes since the distance between campus buildings can be up to 0.7 miles. Students encounter challenges in commuting within the limited break time, impacting their academic performance; this issue is particularly significant due to Kean University's student attendance policy, which requires attendance in all courses and includes attendance as a graded component of any course if stated in the syllabus.

2. Research Purpose

The research project aims to identify the underlying causes of increased student lateness at Kean University by identifying the root causes of the observable symptoms reported by faculty members — specifically, the insufficient time students have to commute between campus buildings during scheduled classes, particularly when facing distances of up to 0.7 miles. Therefore, this research seeks to collect data through an online survey questionnaire from Kean University students attending classes on the east campus (Hynes Hall, Liberty Hall, Enlow Hall, and other main campus buildings.) This group serves as the primary source of information, being directly affected by the problem. Since this research strives to understand students' mobility, it seeks to develop and implement an effective marketing strategy in response to the identified problem. The proposed strategy involves introducing E-Scooter rental services, targeting Kean students. This initiative is designed to meet the needs of Kean students, although faculty and staff could also benefit, by enhancing campus mobility and improved punctuality. Ultimately, it aims to contribute valuable insights for tailoring impactful solutions, addressing the following research questions: (1) What causes students lateness in class? (2) How does lateness influence students' performance? (3) How will an E-Scooter positively impact their mobility?

3. Hypotheses

3.1- Hypotheses

Hypothesis 1: The time it takes to get from one class building to the next significantly contributes to students' lateness to classes.

The choice of this hypothesis is based on the problem definition provided. The observable symptom of increased students' lateness is attributed to insufficient time for commuting between campus buildings during scheduled classes. Distances of up to 0.7 miles indicate a relationship between the time it takes to commute from one class building to another and students' punctuality. Therefore, this hypothesis aims to explore whether the time taken to commute contributes significantly to students' lateness to classes.

Hypothesis 2: Lateness negatively impacts students' academic performance.

This hypothesis is based on the problem definition provided, emphasizing the impact of student lateness on their academic performance. The information gathered states that lateness is considered a significant issue due to Kean University's attendance policy, which includes attendance as a graded component of any course. Therefore, this hypothesis seeks to quantify and understand the potential consequences of student lateness to classes.

Hypothesis 3: Introducing E-scooter rental services will improve punctuality and mobility.

This hypothesis is based on the proposal strategy, the introduction of E-Scooter rental services as a solution to the identified problem. The hypothesis suggests that providing alternative mobility solutions, such as e-scooters, could positively impact student punctuality by

addressing the commuting challenges highlighted in the problem definition. Thus, this hypothesis arises from the proposal strategy, seeking to understand the mobility needs of students as an innovative solution to the observed problem.

3.2- Null and alternative for each hypothesis

Hypothesis 1

H0: The time it takes to get from one class building to the next will not have a significant impact on students' lateness.

H1: The time it takes to get from one class building to the next will have a significant impact on students' lateness.

Hypothesis 2

H0: Lateness to class will not have a significant negative impact on academic performance.

H1: Lateness to class will have a significant negative impact on academic performance.

Hypothesis 3

H0: The introduction of E-Scooters rental services on Kean University campus will not have a significant impact on reducing student lateness to classes.

H1: The introduction of E-Scooter rental services on Kean Students campus will have a significant impact on reducing student lateness to classes.

4. Research Method

4.1 Primary Data Collection

To obtain the information needed for our research project, we gathered data on students' mobility patterns, including average commute times and frequency of lateness. This information will also provide insights into where e-scooter docking stations should be strategically placed. The data method chosen for our project is a survey questionnaire. The survey questionnaire will be conducted to determine the level of importance of students' mobility. This survey questionnaire will provide insights into the impact of e-scooter adoption. We used Google Forms to create our survey questionnaire and distributed it to our respondents through email.

4.2- Sampling Collection

The data sample for this research project is Kean University students with commuting issues regarding the time to get to class. This group represents the primary source of information since they will be directly impacted by the introduction of e-scooters on campus. Our sample pool is appropriate for our research problem because some students on East Campus don't have vehicles, and the shuttle takes a long time to transport them to their destination. For students that have cars on East Campus, traffic and finding parking are factors in why they are sometimes late for class. Through this method, we acquired 50 respondents for our research project.

5. Data Analysis and Results

5.1 Description of descriptive statistics

The dataset, derived from 50 Kean University students experiencing commuting difficulties between classes, sheds light on mobility patterns and perceptions related to academic performance, commute times, lateness, e-scooter usage, and its anticipated impact. The mean score for Academic Performance (Q8) is 2.8, with a median and mode of 3. This suggests a tendency towards moderate performance levels among respondents. The standard deviation of 1.1780 indicates a notable spread in academic performance within the sample. Regarding Time Between Buildings (Q9), the mean is 2.18, with a median and mode of 2. This suggests that, on average, students perceive a moderate time required to move between buildings, with a relatively consistent distribution around this average, as indicated by the standard deviation of 0.8497. Lateness (Q10) has a mean of 1.96, with a median and mode of 2. This suggests that students sometimes experience lateness, likely due to various factors impacting their commute between classes. The standard deviation of 0.6987 shows some variability in lateness among respondents. E-Scooter (Q12) shows a mean of 3.36, with a median of 3 and a mode of 5. This suggests a moderate level of interest or usage of e-scooters among respondents. The standard deviation of 1.4813 indicates some variability in the extent of e-scooter use. Finally, E-scooter Impact (Q13) has a mean of 3.96, a median of 4, and a mode of 5. This suggests that respondents generally perceive a significant positive impact of e-scooter adoption on their mobility, with a relatively narrow spread indicated by the standard deviation of 1.0490.

ID	Academic Performance (Q8)			Time Between Buildings (Q9)		Lateness (Q10)		E-Scooter (Q12)		E-scooter Impact (Q13)	
Mean	25.5	Mean	2.8	Mean	2.18	Mean	1.96	Mean	3.36	Mean	3.96
Standard Error	2.061552813	Standard Error	0.1665986	Standard Error	0.12017	Standard Error	0.098809	Standard Error	0.209489	Standard Error	0.148351
Median	25.5	Median	3	Median	2	Median	2	Median	3	Median	4
Mode	#N/A	Mode	3	Mode	2	Mode	2	Mode	5	Mode	5
Standard Deviation	14.57737974	Standard Deviation	1.1780302	Standard Deviation	0.84973	Standard Deviation	0.698687	Standard Deviation	1.481312	Standard Deviation	1.049003
Sample Variance	212.5	Sample Variance	1.3877551	Sample Variance	0.722041	Sample Variance	0.488163	Sample Variance	2.194286	Sample Variance	1.100408
Kurtosis	-1.2	Kurtosis	-0.7570009	Kurtosis	-0.17186	Kurtosis	0.376194	Kurtosis	-1.19459	Kurtosis	0.857196
Skewness	-3.77627E-17	Skewness	0.0936259	Skewness	0.471337	Skewness	0.42842	Skewness	-0.34306	Skewness	-1.02259
Range	49	Range	4	Range	3	Range	3	Range	4	Range	4
Minimum	1	Minimum	1	Minimum	1	Minimum	1	Minimum	1	Minimum	1
Maximum	50	Maximum	5	Maximum	4	Maximum	4	Maximum	5	Maximum	5
Sum	1275	Sum	140	Sum	109	Sum	98	Sum	168	Sum	198
Count	50	Count	50	Count	50	Count	50	Count	50	Count	50

Figure 1 - Descriptive Statistics

5.2 Analysis techniques

Hypothesis 1 - Results

In our study, we used simple regression to see if "students' lateness" could be predicted by "commute time between buildings." This helps gauge if longer commutes notably contribute to students being late for classes. The regression model is $\text{Lateness} = a + \beta_1(\text{Time Between Buildings})$, indicates the impact of commute time on lateness. This analysis helps determine if commute time between majors is a major factor in students' Lateness. If it shows a significant relationship, it supports the idea that longer commutes lead to more Lateness. If not, it suggests other factors might be more critical in students being late, prompting further investigation.

Figure 2 - Regression Hypothesis 1

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.32174836							
R Square	0.10352201							
Adjusted R Sq	0.08484538							
Standard Error	0.66838976							
Observations	50							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	2.47624647	2.47624647	5.54286498	0.02269556			
Residual	48	21.4437535	0.44674487					
Total	49	23.92						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.38326738	0.26257126	5.26815986	3.2157E-06	0.85533248	1.91120229	0.85533248	1.91120229
(9) Time Betw	0.26455625	0.11237013	2.35432899	0.02269556	0.03862096	0.49049153	0.03862096	0.49049153

Hypothesis 2 - Results

In our study, we used simple regression to explore whether "students' lateness" (dependent variable) could be anticipated by "commute time between buildings" (independent variable). This investigation aims to understand if longer commutes negatively impact students' academic performance by causing them to be late for classes. The regression model is Academic performance = $a + \beta_1(\text{Lateness})$. If a substantial connection emerges, it supports the notion that lateness potentially negatively affects academic performance. Conversely, if this relationship is insignificant, it suggests other factors may play a part in this prediction, prompting further exploration.

Figure 3 - Regression Hypothesis 2

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.21323741							
R Square	0.04547019							
Adjusted R Square	0.02558416							
Standard Error	1.16286309							
Observations	50							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	3.09197324	3.09197324	2.28653871	0.13705717			
Residual	48	64.9080268	1.35225056					
Total	49	68						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.09531773	0.49418535	4.23994299	0.00010115	1.10169148	3.08894398	1.10169148	3.08894398
(Q10) Lateness	0.35953177	0.23776504	1.51213052	0.13705717	-0.11852688	0.83759042	-0.11852688	0.83759042

Hypothesis 3 - Results

For hypothesis number three, we employed simple regression to investigate if "reducing student lateness to classes" (dependent variable) could be predicted by "E-scooter rental services" (independent variable). The regression model developed is E-scooter Impact = $a + \beta_1(\text{E-scooter})$. If the relationship appears to be strong, it suggests that the introduction of

e-scooters to use on campus might indeed impact decreasing the time it takes to get to class. On the contrary, if this connection is weak, it implies other factors might contribute more, urging additional investigation into this relationship.

Figure 4 - Regression Hypothesis 3

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.44286157							
R Square	0.19612637							
Adjusted R Sq	0.179379							
Standard Error	0.95027262							
Observations	50							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	10.5751339	10.5751339	11.7108778	0.00127911			
Residual	48	43.3448661	0.90301804					
Total	49	53.92						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.90625	0.33597211	8.65027172	2.3334E-11	2.23073281	3.58176719	2.23073281	3.58176719
Q12 E-Scooter	0.31361607	0.0916439	3.42211598	0.00127911	0.12935365	0.49787849	0.12935365	0.49787849

5.3 Analysis of hypotheses

Hypothesis 1 - Analysis

Regression Model

$$y = a + \beta_1(x) \text{ --- Lateness} = a + \beta_1(\text{Time Between Buildings})$$

$B_1 = 0.2646$. Therefore, when the time between buildings increases by 1 minute, the students' lateness to class will increase by 0.2646 minutes.

R² Simple Regression

$$R^2 = 0.1035$$

The simple regression model predicts a weaker linear relationship between x and y, indicating that the independent variable explains only a small portion of the variability in the dependent variable. Therefore, we can conclude that the majority of the variability in students' lateness is not explained by the time it takes a student to commute within class buildings since the linear relationship is relatively weak.

Results

At a 5% level of significance, there is sufficient evidence to reject the null hypothesis since the p-value for “Time Between Buildings” is 0.0227 which means that is less than alpha (0.05). Thus, we can conclude that there is a significant impact of the time it takes to get from one class building to the next on a student's lateness.

Hypothesis 2 - Analysis

Regression Model

$$y = a + \beta_1(x) \text{ --- Academic Performance} = a + \beta_1(\text{Lateness})$$

$B_1 = 0.3595$. Therefore, when the number of lateness increases by 1 per week, the students' academic performance will negatively be affected by 0.3595.

R² Simple Regression

$$R^2 = 0.0455$$

The simple regression model predicts a weaker linear relationship between x and y, indicating that the independent variable explains only a small portion of the variability in the dependent variable. Therefore, we can conclude that the majority of the variability in students'

academic performance is not explained by the number of lateness per week since the linear relationship is relatively weak based on this model.

Results

At a 5% level of significance, there is insufficient evidence to reject the null hypothesis since the p-value for “Number of Lateness ” is 0.1371 which means that is greater than alpha (0.05). Therefore, we can conclude that lateness to class will not have a significant negative impact on students’ academic performance.

Hypothesis 3 - Analysis

Regression Model

$$y = a + \beta_1(x) \text{ --- E-scooters impact} = a + \beta_1(\text{E-scooters})$$

$B_1 = 0.3136$. Therefore, when the number of e-scooters increases by 1 unit, the impact on reducing students' lateness to class will increase by 0.3136.

R² Simple Regression

$$R^2 = 0.1961$$

The simple regression model suggests a moderate prediction of the level of relationship between x and y, indicating that the independent variable explains only a moderate portion of the variability in the dependent variable. Therefore, we can conclude that the other part of the variability between the introduction of e-scooters and the impact of reducing students' lateness is still unexplained by this model.

Results

At a 5% level of significance, there is sufficient evidence to reject the null hypothesis since the p-value for “Introduction of E-scooters ” is 0.001279107, which means that is less than alpha (0.05). Therefore, we can conclude that introduction of E-scooter rental services on Kean Students campus will have a significant impact on reducing student lateness to classes.

6. Conclusions & Recommendations

6.1 Recommendations regarding proposed marketing strategy

-Recommendation 1

After thoroughly analyzing the research data, we would recommend Kean University to introduce E-Scooter rental-services on campus for students to utilize. Hypothesis 1 concludes there is a direct relationship between the time it takes for students to travel from different class buildings and students being late to classes. From our research prior to conducting the analysis, it was found that the furthest distance between class buildings is 0.7 miles. Students are limited to 15 minute passing time between classes, ultimately putting the student in a position to travel across campus to reach their next designated class building in a minimal amount of time. Implementing E-Scooters on campus use would be beneficial to students who have back to back classes in different buildings on campus to ensure they are getting to class in a timely manner. To support this, our research from hypothesis 3 concludes that an E-Scooter rental service on campus would have a significant impact on decreasing the amount of students being late to class.

-Recommendations 2

To further expand on our marketing strategy, we would recommend Kean University to develop a user-friendly mobility application to provide students to conveniently locate and access the E-Scooter. The application should include features such as user registration, rental selection, locations of charging hubs and scooters, and safety guidelines. These main features will help ensure the E-Scooters are utilized in a proper, but also safe way. To strategically place where the E-Scooter hubs are located, we are listening to the students' opinion. In our survey questionnaire, we asked participants “Which of the following locations would you prefer the e-scooters to be placed? (Select all that apply).” Participants were given the option of Main Campus, East Campus, and Liberty Hall Campus. Students who participated opted for all three locations, with a major emphasis on Main Campus. To cater to the students' needs, we should place the E-Scooter hubs on Main Campus, Liberty Hall, and East Campus (Hynes Hall and Enlow Hall). Students will be able to locate the nearest E-Scooter to them through the app. Providing students with several hubs around campus and an easy to use app will allow for a more seamless experience for students and ultimately cut down travel time.

-Recommendation 3

Our final recommendation after conducting research is for Kean University to form a partnership with an E-Scooter business, such as Spin. Spin is a E-Scooter company that is partnered with more than 28 universities in the US. Their mission is to transform campuses and

communities by providing accessible, affordable and sustainable forms of transportation. Spin Hubs are said to keep the scooters both organized and charged to ensure the most amount of availability for students. They also value safety in their products as well as the participants of our questionnaire. On a scale of “not important” to “extremely important”, the majority of participants chose “important”, “very important” and “extremely important” for their answers. Spins mission and values directly correlate with the vision we see for Kean University students. We want to provide students with a convenient and easy solution to being late for class on our large campus. A partnership with Spin would be beneficial to achieve our goal of the use of E-Scooters on campus to decrease the amount of students who are late for their classes.

6.2 Limitations.

One limitation for ours was a small sample size. The population of Kean is about 12,000 students, and we only had 50 respondents. This small sample size may compromise data and information that could have created better recommendations. Our research method was only a survey, and we distributed it to other Kean students through their school email as this was a free, convenient and time friendly way to collect data. In the future, we can conduct an additional survey to obtain more data pertaining to students spending habits on campus. We can send these surveys through email and have physical copies at Kean’s student halls, dorms, dining halls and library as that can increase our sample size. Our hypotheses 1 and 3 conclude that E-scooters benefit students by reducing their lateness to class, so additional research would determine if they are willing to pay for the services.

7. Appendices

1. Copy of questionnaire (Includes coding)

1. How old are you?

- a. 17-20
- b. 21-23
- c. 24+

2. Which residency status most accurately describes your current living situation?

- a. On-campus dorm -> Q2_on_campus=1
- b. Off-campus apartment/house -> Q2_off_campus=1
- c. Live at home -> Q2_live_at_home=1
- d. Other -> Q2_other=1

3. Where are your classes located this semester? (Select all that apply)

Center for Academic Success(CAS)=1

Hennings Hall=1

Hutchinson Hall=1

Green Lane Building=1

Hynes Hall=1

Bruce Hall=1

North Ave Academic Building (NAAB)=1

Townsend Hall=1

Science Building=1

Liberty Hall=1

D-Angola Gymnassium=1

Vaughn Eames Hall=1

STEM Building=1

Enlow Recital Hall=1

Wilkins Threate=1

4. Do you drive a car to campus?

Yes=1

No=1

5. If you answered "Yes" to question 4, How many times per week do you drive your car to campus?

1-2=1

3-4=2

5 or more=3

6. What means of transportation do you use to move around campus? (Select all that apply)

Car=1

Shuttle Bus=1

Walking=1

Bicycle=1

Other=1

7. If you drive to your class buildings, how accessible is campus parking to you?

Extremely inaccessible 1	Somewhat inaccessible 2	Neither inaccessible nor accessible 3	Somewhat accessible 4	Extremely accessible 5
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8. On a scale from 1 to 5, how much does lateness to class negatively affect your academic performance?

No impact on academic performance 1	Slight impact on academic performance 2	Moderate impact on academic performance 3	Significant impact on academic performance 4	Extreme impact on academic performance 5
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9. On average, how much time does it currently take you to get to class from one building to the next?

Less than 5 minutes=1

6-10 minutes=2

11-15 minutes=3

16-20 minutes=4

More than 21 minutes=5

10. How many times per week are you late to class?

0 =1

1-2=2

3-4=3

5 or more=4

11. On a scale from 1 to 5, does the traffic on campus affect the time it takes you to get to class?

No affect 1	Slight effect 2	Moderate effect 3	Significant affect 4	Very much effect 5
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12. If available on campus, how likely would you use e-Scooters?

Very unlikely 1	Somewhat unlikely 2	Neutral 3	Somewhat likely 4	Very likely 5
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13. On a scale from 1 to 5, what impact do you think e-scooters would have in decreasing the time it takes you to get to class? *

No impact 1	Slight impact 2	Moderate impact 3	Significant impact 4	Extreme impact 5
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14. Please rate the following factors in order of importance when considering the use of e-scooters.

Not important 1	Somewhat important 2	Important 3	Very important 4	Extreme important 5
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15. Which of the following locations would you prefer the e-scooters to be placed? (Select all that apply)

Main Campus=1

East Campus=1

Liberty Hall Campus=1


16. On a scale from 1 to 5, how comfortable do you feel about the safety of using e-scooters on snow-covered roads?

Very uncomfortable 1	Somewhat uncomfortable 2	Neutral 3	Somewhat comfortable 4	Very comfortable 5
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17. On a scale of 1 to 5, how likely are you to use an app for the e-scooter service?

Very unlikely 1	Somewhat unlikely 2	Neutral 3	Somewhat likely 4	Very likely 5
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2. Excel Output of statistical tests.

 E-scooters-Data

https://docs.google.com/spreadsheets/d/1Hw4mqCtGjTT5dewHj2kPQ_bWp8xHwtESnWnTM4FJa9c/edit?usp=sharing

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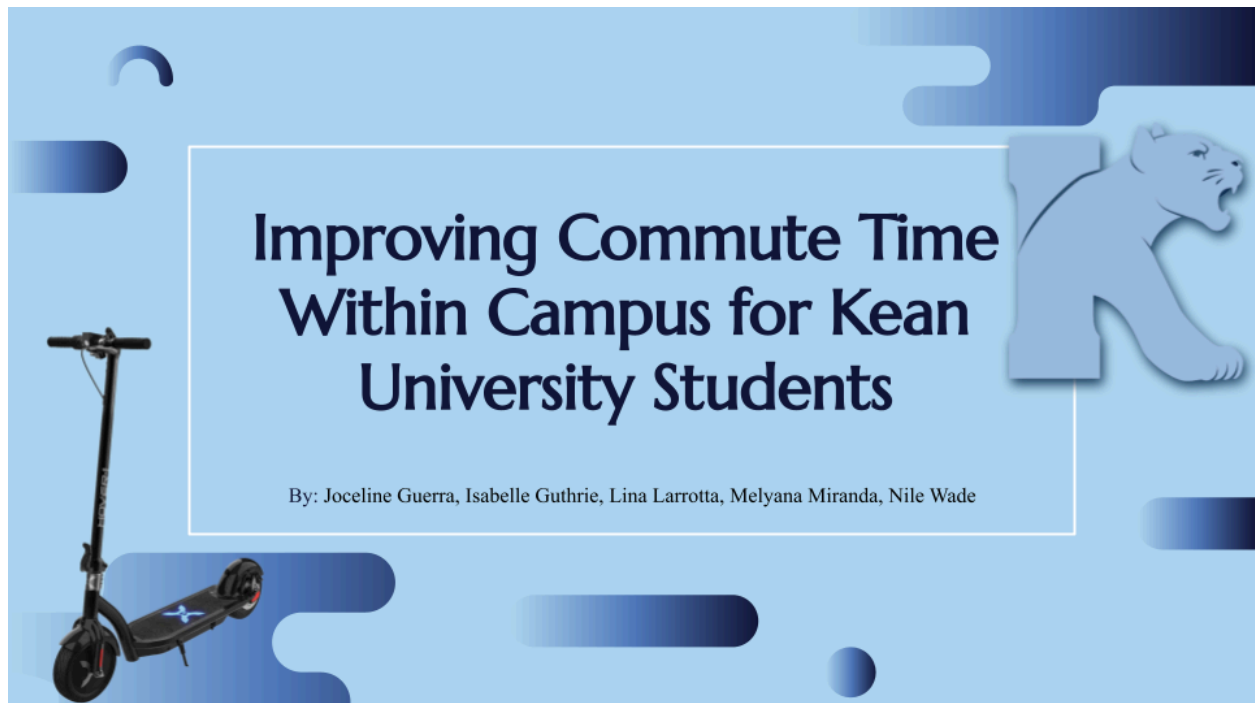
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8. Additional Files

1. Presentation Slides



Problem Definition

- Research focuses on Kean University students, known for excellence in higher education.
- Offers diverse programs across six colleges and various academic disciplines.
- Concerns arise over increasing student lateness reported by faculty.
- Insufficient time to commute between distant buildings (up to 0.7 miles).
- Commuting challenges affect academic performance due to strict attendance policies.



Research Purpose

- Identify the causes of student lateness
- **Proposed Strategy:** E-Scooter rental services, targeting Kean Students
- **Research Questions:**
 - What causes student lateness in class?
 - How does lateness influence students' performance?
 - How will an E-Scooter positively impact their mobility?



Research Design

Primary Data Collection

- Collected data on mobility patterns, commute times, and lateness
- Insights for strategic e-scooter docking station placement
- Utilized a survey questionnaire via Google Forms
- Survey determined importance of mobility and e-scooter impact

Sampling Collection

- Targeted Kean University students enrolled in the Fall 2023 semester
- Obtained 50 random respondents



Descriptive Statistics

Lateness (Q10)

- Mean: 1.96; Median & Mode: 2
- Occasional lateness due to commute factors
- Standard deviation: 0.6987; variability in lateness among respondents

Academic Performance (Q8)

- Mean: 2.8; Median & Mode: 3
- Indicates moderate performance tendency
- Standard deviation: 1.1780; notable spread in performance

E-Scooter (Q12)

- Mean: 3.36; Median: 3; Mode: 5
- Moderate interest/usage of e-scooters
- Standard deviation: 1.4813; variability in e-scooter use extent

Time Between Buildings (Q9)

- Mean: 2.18; Median & Mode: 2
- Students perceive moderate time between buildings
- Standard deviation: 0.8497; consistent distribution around average

E-Scooter Impact (Q13)

- Mean: 3.96; Median: 4; Mode: 5
- Respondents perceive significant positive impact
- Standard deviation: 1.0490; relatively narrow spread

ID	Academic Performance (Q8)		Time Between Buildings (Q9)		Lateness (Q10)		E-Scooter (Q12)		E-scooter Impact (Q13)		
Mean	25.5	Mean	2.8	Mean	2.18	Mean	1.96	Mean	3.36	Mean	3.96
Standard Error	2.061552813	Standard Error	0.1665986	Standard Error	0.12017	Standard Error	0.098809	Standard Error	0.209489	Standard Error	0.148351
Median	25.5	Median	3	Median	2	Median	2	Median	3	Median	4
Mode	#N/A	Mode	3	Mode	2	Mode	2	Mode	5	Mode	5
Standard Deviation	14.57737974	Standard Deviation	1.1780302	Standard Deviation	0.84973	Standard Deviation	0.698687	Standard Deviation	1.481312	Standard Deviation	1.049003
Sample Variance	212.5	Sample Variance	1.3877551	Sample Variance	0.722041	Sample Variance	0.488163	Sample Variance	2.194286	Sample Variance	1.100408
Kurtosis	-1.2	Kurtosis	-0.7570009	Kurtosis	-0.17186	Kurtosis	0.376194	Kurtosis	-1.19459	Kurtosis	0.857196
Skewness	-3.77627E-17	Skewness	0.0936259	Skewness	0.471337	Skewness	0.42842	Skewness	-0.34306	Skewness	-1.02259
Range	49	Range	4	Range	3	Range	3	Range	4	Range	4
Minimum	1	Minimum	1	Minimum	1	Minimum	1	Minimum	1	Minimum	1
Maximum	50	Maximum	5	Maximum	4	Maximum	4	Maximum	5	Maximum	5
Sum	1275	Sum	140	Sum	109	Sum	98	Sum	168	Sum	198
Count	50	Count	50	Count	50	Count	50	Count	50	Count	50

Hypothesis Testing

1. What causes students lateness in class?

- a. **H₀**: The time it takes to get from one class building to the next will not have a significant impact on students' lateness.
- b. **H₁**: The time it takes to get from one class building to the next will have a significant impact on students' lateness.

2. How does lateness influence students' performance?

- a. **H₀**: Lateness to class will not have a significant negative impact on academic performance.
- b. **H₁**: Lateness to class will have a significant negative impact on academic performance.

3. How will an E-Scooter positively impact their mobility?

- a. **H₀**: The introduction of E-Scooters rental services on Kean University campus will not have a significant impact on reducing student lateness to classes.
- b. **H₁**: The introduction of E-Scooter rental services on Kean Students campus will have a significant impact on reducing student lateness to classes.

Hypothesis 1- Analysis

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.32174836							
R Square	0.10352201							
Adjusted R Sq	0.08484538							
Standard Error	0.66838976							
Observations	50							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	2.47624647	2.47624647	5.54286498	0.02269556			
Residual	48	21.4437535	0.44674487					
Total	49	23.92						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.38326738	0.26257126	5.26815986	3.2157E-06	0.85533248	1.91120229	0.85533248	1.91120229
(9) Time Betw	0.26455625	0.11237013	2.35432899	0.02269556	0.03862096	0.49049153	0.03862096	0.49049153

R² Simple Regression

- Weaker relationship.
- The majority is not explained.

Results

- At 5% level of significance, we reject the null hypothesis.
- There is a significant impact of the time it takes to get from one class to the next on a student's lateness.

Hypothesis 2- Analysis

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.21323741
R Square	0.04547019
Adjusted R Sq	0.02558416
Standard Error	1.16286309
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.09197324	3.09197324	2.28653871	0.13705717
Residual	48	64.9080268	1.35225056		
Total	49	68			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.09531773	0.49418535	4.23994299	0.00010115	1.10169148	3.08894398	1.10169148	3.08894398
(Q10) Lateness	0.35953177	0.23776504	1.51213052	0.13705717	-0.11852688	0.83759042	-0.11852688	0.83759042

R^2 Simple Regression

-Weaker relationship.

-Only a small portion is explained.

Results

-At 5% level of significance, there is *insufficient* evidence to reject the null hypothesis.

-Lateness to class will not have a significant negative impact on students' academic performance.

Hypothesis 3- Analysis

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.44286157
R Square	0.19612637
Adjusted R Sq	0.179379
Standard Error	0.95027262
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	10.5751339	10.5751339	11.7108778	0.00127911
Residual	48	43.3448661	0.90301804		
Total	49	53.92			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.90625	0.33597211	8.65027172	2.3334E-11	2.23073281	3.58176719	2.23073281	3.58176719
Q12 E-Scooter	0.31361607	0.0916439	3.42211598	0.00127911	0.12935365	0.49787849	0.12935365	0.49787849

R^2 Simple Regression

-Moderate level of relationship.

-Only a moderate portion is explained.

Results

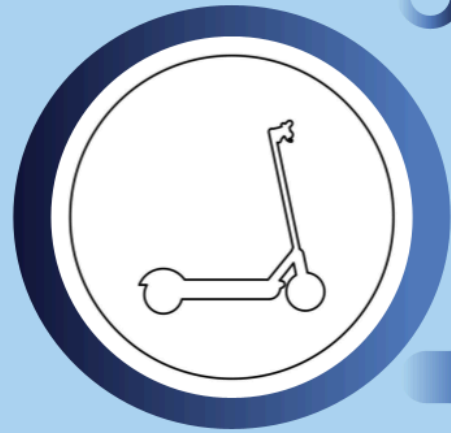
-At 5% level of significance, we reject the null hypothesis.

-E-scooters on campus will have a significant impact on reducing students lateness to classes.

Recommendations

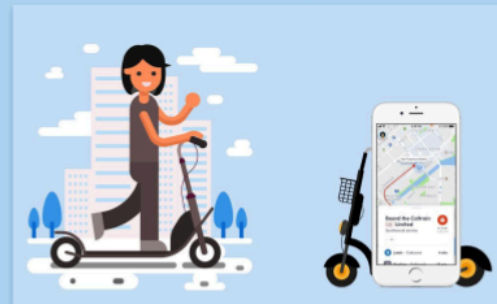
Implement E-Scooters at Kean University

- Prior research: furthest distance between class buildings is 0.7 miles
- 15 minutes passing time
- Hypothesis 1: Direct relationship between the time it takes for students to travel from different class buildings and students being late to classes
- E-Scooters on campus would be beneficial to students to ensure they get to class on time
- Hypothesis 3: E-Scooter rental service on campus would have a significant impact on decreasing the amount of students being late to class



E-Scooter App

- Develop user-friendly app for students
 - ◆ Conveniently locate and access E-Scooters
- App features
 - ◆ User registration
 - ◆ Rental selection
 - ◆ Locations of charging hubs and scooters
 - ◆ Safety guidelines
- Locations of E-Scooter hubs
 - ◆ Main Campus
 - ◆ Liberty Hall
 - ◆ East Campus (Hynes Hall and Enlow Hall)
- Students will be able to locate the nearest E-Scooter to them through the app
- Several hubs around campus and an easy to use app will create a more seamless experience for students and ultimately cut down travel time between classes



Partnership With E-Scooter Company

- Spin
 - ◆ Partnered with more than 28 universities in the US
 - ◆ Mission is to transform campuses and communities by providing accessible, affordable and sustainable forms of transportation
 - ◆ Spin Hubs keep scooters organized and charged for optimal accessibility
 - ◆ Value safety
- Questionnaire participants value safety if E-Scooters were to be placed on campus
 - ◆ Spin's values align with participants of our survey, looking for an easy and safe way to get to class
- A partnership with Spin would be beneficial to achieve our goal of the use of E-Scooters on campus to decrease the amount of students who are late for their classes



Limitations

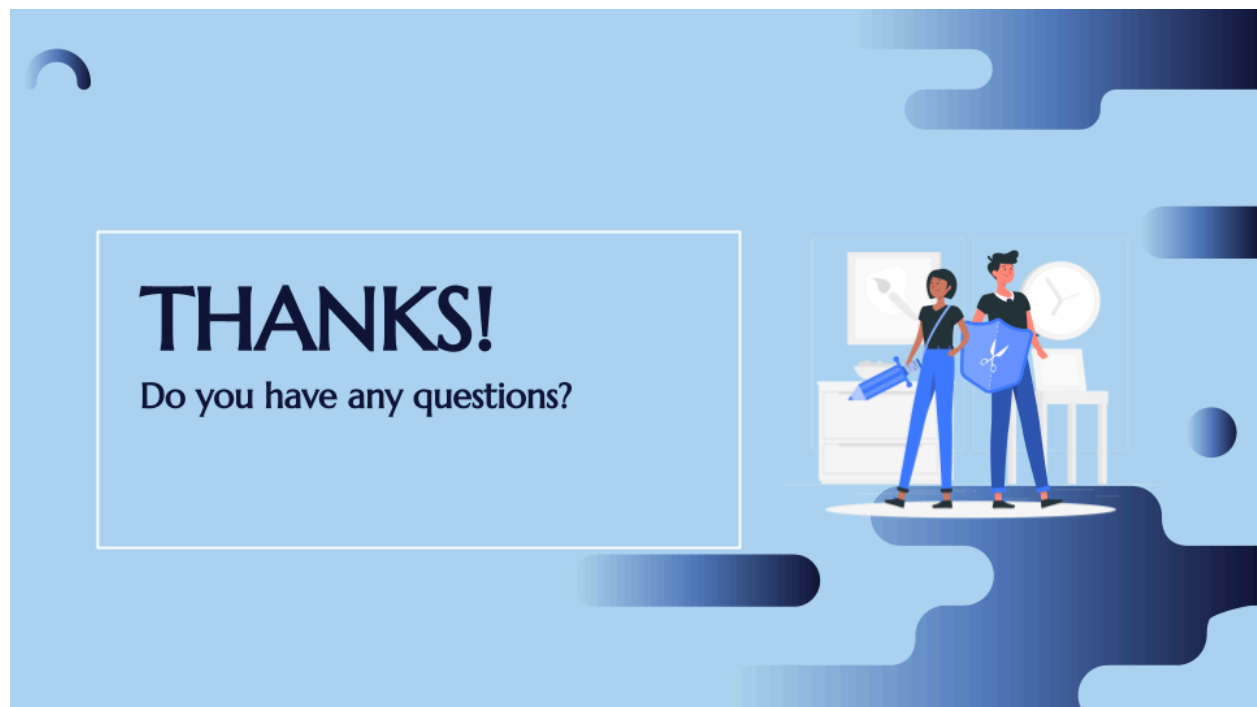
Sample Size

- Kean population is about 12,000 students
 - 50 respondents
 - Distributed a survey to Kean students email.
- Small sample size compromises data and information that would have created better recommendations

Additional Research

- Additional surveys
 - Distributed through email and physical copies available on campus (Dorms, student halls, dining halls and library)
 - Hypotheses 1 and 3 determine
 - Obtain information about spending habits on campus
 - Data can determine the willingness to pay for the services





RESOURCES

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- Skoro, Mia. "Better Late Than Never: Tardiness Remains a Consistent Issue Among Students." *The La Salle Falconer*, lasallefalconer.com/2020/01/better-late-than-never-tardiness-remains-a-consistent-issue-among-students/#:~:text=The%20survey%2C%20whose%20results%20are,to%20avoid%20going%20to%20class
- Spin. (n.d.). Campuses. Spin scooters. Retrieved December 9, 2023, from <https://www.spin.app/campuses>
- *Students Need More Time Between Classes – the Weekly Ringer*. 2 Sept. 2021, theweeklyringer.com/2021/09/02/students-need-more-time-between-classes