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by

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Abstract

This paper discusses wireless technology in academic institutions in Rome and Pittsburgh. Rome accommodates many institutions of higher education and is promoting private ventures to help sustain their economy. Pittsburgh is a leader in higher education and is thriving from medical and technological research. Information technology's influence on academic institutions has been cited as a "disruptive technology" or one that revolutionizes itself for the better. Wireless technology is one of the most important technologies being implemented on university campuses today. This study makes three hypotheses comparing the wireless technology in Rome and Pittsburgh. These hypotheses suggested that the usage, technical level, and security are greater in Pittsburgh than in Rome. The method used to gather this data was a survey of closed-ended questions. This study's findings supported two of the three hypotheses. More research is needed to explore the third hypothesis and to further discuss wireless technologies between cultures.

Wireless Technology Within Academic Institutions:

An Exploratory Study Between Rome and Pittsburgh

Wireless technology is reshaping the way people share information and is becoming a dominant force in the world around us. The proper use and administration of wireless technology will ultimately determine the extent of benefits that can be leveraged from this technology. As Kenneth Green explains, "Wireless [technology] is clearly exploding across college campuses, much as it has in the corporate and consumer sectors" (as cited in Roach, 2004, p. 38). In a recent study by the College of Education at the University of Illinois in Urbana-Champaign, wireless networking was the focus for a wireless laptop lab. The study presented a hypothesis that both students and professors would have positive expectations for wireless usage. The result of this study not only confirmed this hypothesis but also acknowledged that students and professors had even more positive views of wireless usage after their experiences with the wireless technology. One student noted that he "liked the fact that we were free to move around with the iBooks and not be tied down to a station" (Varvel & Thurston, 2002, p. 487). With wireless transmissions and technology, users are free to move at their convenience, and have more frequent access to the Internet. Faculty and staff members can move to various locations with their technology to help students or to collaborate with colleagues. For students, this freedom of movement is largely beneficial for group work, which often exists in higher education. By studying the wireless technology in academic institutions, one can examine how wireless technology affects academic institutions in regards to research and communication. Therefore, one can analyze what cultural trends wireless technology has on academic institutions to better understand how cultures communicate through the wireless technology.

This study will examine the many facets of wireless technology in Rome, Italy and in Pittsburgh, Pennsylvania. These two cities have been chosen based upon their economical stature in their respective countries and for their dedication to higher education through the various institutions that they both accommodate within their region. This paper will include information regarding the differences in the use of wireless technology in Rome and Pittsburgh and then evaluate the usage and administration in both cities in an effort to gauge the importance wireless technology has on each culture and offer further areas of research.

This thesis will be divided into four sections. First, I present my rationale for selecting Rome and Pittsburgh, as well as appropriate scholarship pertaining to wireless technology. Next, the methodology used for this study is described. Third, the survey findings are reported. To conclude, the results of the survey are discussed and suggestions for future research are offered.

Literature Review

Wireless technology will be discussed in three central themes: information technology's influence on university campuses, wireless standards, and wireless security features. When discussing information technology (IT), specifically wireless technology, there are many different components that build the infrastructure of IT and its capabilities. To implement information technology, there must be a need to implement the desired technology and the proper funds must be available to complete the implementation. Therefore, this review of literature will first detail the strengths and similarities of Rome and Pittsburgh. Then, information about how IT has influenced the academic world of higher education, as well as the standards and the security that are relevant to the wireless technology commonly used today in higher education will be addressed.

Rome, Italy

For centuries, Rome has been known as the "Eternal City" a city that is never dying and always adjusting to political and economical struggles and changes. In recent years, Rome remains a major center for higher education and economical richness in Italy (USA Today, 2006). Rome boasts a city full of brilliant minds, young and aged alike. Within the city, countless universities can be found, including: Università degli Studi di Roma La Sapienza, University of Rome Tor Vergata, Roma Tre, Università Campus Bio-Medico, The American University of Rome, John Cabot University, and numerous other branch schools from other parts of the country and the world. The first three respective universities listed above are all public universities. Università degli Studi di Roma La Sapienza is Western Europe's largest university with over 140,000 students (Sapienza, 2006). At The American University of Rome, over 35 different nations are represented through faculty, staff, and students, which invite many cultural values towards wireless technology (AUR, 2005).

Along with Rome's vast array of higher education facilities, Rome is also boasting a shift to private investment to help sustain a struggling Italian economy compared to its Western European counterparts (CIA, 2006). As *USA Today* points out in their city overview of Rome, Rome is "…encouraging major national and multinational companies to set up operations in the city" (USA Today, 2006, n.p.). Rome, embracing its nickname of "The Eternal City," is doing just what it needs to do to adjust to changes in the economy. Rome is moving from a city of much public employment to one that now encourages private investment (USA Today, 2006).

Pittsburgh, Pennsylvania

Pittsburgh, the "Steel City," is known for its blue-collared history and steel mills. These steel mills may be gone, but Pittsburgh has turned into a leading medical and higher education

city (Pittsburgh, 2006). In the southwestern region of Pennsylvania surrounding Pittsburgh, there are over 25 colleges and universities: Robert Morris University, Duquesne University, Carnegie Mellon University, and The University of Pittsburgh are just a few examples. The University of Pittsburgh is the largest of the schools in this region and is a leading force in medicine with its Medical Center (Pitt, 2006). However, one should not discount Robert Morris, Duquesne, and Carnegie Mellon. Robert Morris University boasts one of the best business schools in the region, while Duquesne University hosts a top pharmaceutical school, and Carnegie Mellon University is a pioneer in robotics and technology (RMU, 2006; DUQ, 2006; CMU, 2006).

Due to the change in Pittsburgh's business operations, the economy is shifting to one that spurs business technology. According to the National Science Foundation Director Arden Bement: "In almost all of the emerging technologies -- biotechnology, nanotechnology and information technology -- Pittsburgh is near the top of the list" (DaParma, 2005, n.p.). Bement also stated that with the "major industries here (in Pittsburgh) you can take that technology and use it to devise new products" (DaParma, 2005, n.p.). With the research labs across the various universities and the emerging business opportunities, Pittsburgh is embracing technology.

Information Technology's Influence

Information Technology (IT) has been drastically changing the way most have conducted their lives on both social and professional levels. IT has been instituted into the United States academic institutions and appears that it will only increase in importance and prominence for students, faculty, and staff. Wulf and Duderstadt state that IT has been cited as a "disruptive technology" (2003, p. 82). This means that it is capable of explosively displacing older technologies to help satisfy our current needs better. Due to IT's disruptive influence on the

university campus, the entire university infrastructure is bound to change; if it has not already. North Carolina State University Chancellor Mary Anne Fox states that IT's influence on the University will be "profound, rapid, and discontinuous," affecting all levels of the University (Wulf & Duderstadt, 2003, p. 82). Changes through the way students learn, the way professors teach, and the way a staff operates have been brought about or are occurring due to IT, especially wireless technologies. These wireless technologies allow access to many online libraries and resources that are otherwise inconvenient to students and faculty who are in locations away from a standard wired network (Falk, 2003). Through the capabilities of wireless technology to connect to a network, students become more mobile and may take laptops to various locations to do work, share information, and gather in study groups. Professors have the ability and convenience to conduct research with greater mobility and possibly conduct classes in various locations that are relevant to the class. According to Varvel and Thurston, staff will be able to collaborate with other colleagues in various locations for meetings, due to the convenience of wireless technology (2002, p. 487). IT and wireless technology will continue to influence the way all three of these levels in the university will conduct their business.

Wireless technology is drastically becoming one of the largest, quickest, and most important technologies being implemented on university campuses today. "A steady growth in the use of wireless networks on American college campuses represents one of the most significant trends in the higher education information technology (IT) landscape" (Roach, 2004, p. 38). According to the Campus Computing Project's 2006 National Survey of Information Technology in US Higher Education, 51.2% of colleges and universities report that they have full wireless network coverage in their classrooms, up from 42.7% in 2005 and 31.1% in 2004. As of October 2006, 68.8% of college campuses are reporting that they have plans or plans are

underway for wireless network coverage for their Fall 2006 semesters; this percentage is up from 64.0 % in 2005 and 53.3% in 2004 (Green, 2006). Since our society relies on universities for numerous valuable research studies, information needs to flow freely, quickly, and as often as possible and wireless networks permit this.

A point of emphasis for the need of IT and wireless connectivity is the Internet. The Internet, which is a "global network connecting millions of computers," has no beginning or end (Webopedia, 2005). The amount of data and information that can be accessed and broadcast is abundant. In a survey including American schools sponsored by the McGraw-Hill Ryerson company, over 80% of "faculty members believe that Web-based technology has become a key contributor to student success" (Falk, 2003, p. 63). One valuable use of the Internet is web-based classes. Across many campuses today, students are not walking to class for lectures and discussions, but rather asking questions using discussion threads and turning in assignments the night before they are due via e-mail. With this use of web-based classes, students are not only learning required material through sight and sound (via the multimedia); they are also using and learning technology which they can use in the future to better transmit information to others. According to researchers Medlin, Vannoy, and Dave, they state that "With regard to distance education, students hear, see and continually utilize the technologies" (2004, p. 427). Through the use of these technologies, students gain valuable technical skills for careers after graduation. With these skills, students know how to properly use technology to communicate over great distances, which could be vital in a global business environment.

With the presence of wireless networks sprouting up all over American campuses, and the increasing availability of the Internet at our fingertips, our campuses are changing. All of the activities of the university are changing and will continue to build upon these changes as newer

technologies are developed. Not only is the technology becoming faster and more accurate with its performance and calculations, but the technology is also becoming significantly less expensive. According to Wulf and Duderstadt, "for the past four decades, the speed and storage capacity of computers have doubled every 18 to 24 months; the cost, size, and power consumption have become smaller at about the same rate" (2003, p. 82). This increase in performance and abilities (and decrease in cost) will make it more plausible that technology will be purchased for the university and the university will thrive on these revolutions, in the United States as well as in Italy.

Wireless Standards and Security

The wireless transmission of data is a great tool and opportunity to have at our fingertips. However, this ability brings new precautions and security concerns that make administrators and managers reevaluate their network security. As Siegel, Levine, and Siegel report "A detailed analysis of the security features of the wireless network is crucial in the evaluation and audit of any company and in an assessment of controls in the accumulation, processing, and reporting of financial data" (2004, p. 68). By analyzing the standards and security features of a wireless network, a better understanding of how a company conducts its business is displayed. The extent to which a company complies with approved standards shows how much value a company places on secure wireless transmissions and the information being sent across the air; therefore, one can discuss how advanced administration levels are in wireless transmission technology. Many of the common standards and means of security for wireless technology will be discussed.

Wireless Standards

Wireless local area networks (WLANs) are transmitted using a radio signal through an access point (AP), commonly known to users as "hot spots," where wireless fidelity, or Wi-Fi,

can be found (Siegel, Levine, & Siegel, 2004). To capture these radio signals, Wi-Fi clients, such as wireless notebooks, personal digital assistants, and specific enabled cellular phones are needed. However, there is more to the wireless connection than just having the "right" device. Different devices come equipped with their own specifically designed cards to capture the radio signals. Each device has a set of standards for wireless connectivity. These standards all have different security measures and speeds of transmitting data (Cracking, 2004). Focusing on these standards allows administrators to choose the most appropriate technology for their users.

Currently, there are three commonly found standards used in homes and businesses. Vakil points out that each standard provides something that the other does not, each having an appropriate use for a specific setting. The first type of standard is 802.11a. This standard operates using the 5 GHz radio spectrum to transmit data. The 802.11a standard also transmits data at 54 Mbps. The second type of standard is the 802.11b standard. This standard operates using the 2.4 GHz radio spectrum to transmit data. However, the 802.11b standard only transmits data at 11 Mbps. The third standard available is the 802.11g standard. The 802.11g standard also operates using the 2.4 GHz radio spectrum like the 802.11b. However, the 802.11g standard is also similar to the 802.11a standard because it can transmit data at 54 Mbps (Vakil, 2005). When deciding between the two, Dean states that the 802.11g standard is often the preferable choice because it has a transmission range of up to 100 meters or about 330 feet and is more compatible with the 802.11b standard. This is also a considerable difference in distance when compared to the similar 802.11a standard, which transmits data at the same speed but only at a distance of 20 meters or 66 feet (Dean, 2006, p. 315). By understanding the standards, administrators can implement hardware and software technology that allows for the greatest or least amount of compatibility, whichever is desired, as well as technological sophistication.

Since these standards all operate differently, they are used for different purposes. Even though the 802.11g and the 802.11a standard transmit the same amount of data, the 802.11a operates on the 5 GHz spectrum, which has more channels from which to broadcast a signal. Therefore, common practice and use shows that the 802.11a standard is used primarily for large-scale installations, such as in a company or university setting. The 802.11g standard also has a smaller throughput at extended distances compared to the 802.11a standard. The most common use of the 802.11g standard is in home use or networks where distance is not usually a factor and throughput remains high. The 802.11b standard is still used but it is not as prevalent as the others; it is appropriate for an office or college dorm room. The low prevalence of use is because the throughput is much lower than the rest and reduces drastically with distance (Siegel, Levine, & Siegel, 2004).

Wireless Security

Since WLANs are broadcast over a certain coverage area, virtually anybody within that coverage area can access the WLAN. Obviously, the ability for anybody to connect to the WLAN has advantages and disadvantages. The main disadvantage of this is that network administrators do not know who may be within this coverage range and what they can do once inside the network. Therefore, wireless security must be in place from the onset to protect against any threats.

On any WLAN there are filters that can be implemented to prevent unauthorized access to the WLAN, via the AP. With home networks, Media-Access Control (MAC) filters are a common tool used to limit access only to users with approved network cards. As Siegel, Levine, and Siegel help to explain in *Security Safeguards Over Wireless Networks*, these MAC addresses

are unique to each network card or device and these filters help prevent unauthorized network cards or users from accessing the network (2004).

Another form of recommended security is the encryption of data. Encrypting data ensures that only users with the correct rights are able to decipher the data sent across the air via radio waves (Siegel, Levine, & Siegel, 2004). The two most common forms of encrypting data are the use of Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA). Users are required to enter at least a 64 bit key when attempting to connect to the WLAN. Once authenticated, users can then work on the WLAN with every packet of information sent being encrypted using the older WEP standard or the newer WPA standard (Vaughan-Nichols, 2003).

With new technology becoming available almost everyday, newer standards will be available that will allow wireless connectivity to become cheaper, faster, and more reliable in the near future. One bright outlook for the wireless security world is the 802.1X standard. This standard builds on the WEP technology and, once in common usage, will also allow for more compatibility between different devices as well as the increased security (Cracking, 2004).

Rome accommodates various institutions of higher education as well as Western Europe's largest institution, Università degli Studi di Roma La Sapienza. Rome is also at a stage where the city is promoting private ventures and employment rather than relying upon public works. Pittsburgh's steel mill economy is gone, but that has not stopped the city from prospering. Like Rome, Pittsburgh's southwestern region of Pennsylvania is a leader in higher education, accommodating over 25 higher education institutions. Regarding technology's influence on academic institutions, IT has been cited as a "disruptive technology." This means that it is capable of explosively displacing older technologies to help satisfy our current needs better. Specifically, wireless technology is becoming one of the most important technologies

being implemented on university campuses today. Common wireless standards being used today on university campuses range from the 802.11a, the 802.11b, and the 802.11g standards. These standards allow for transmission speeds up to 54 Mbps and broadcast their signals on different radio spectrums. To secure data, MAC address filers are often in place as well as the encryption of data. Two of the more common features are WEP and the newer, WPA. These encryptions methods require users to enter keys to connect to the wireless connection.

Hypotheses

Given that Rome and Pittsburgh both promote and accommodate many leading institutions of higher education in their respective areas of study, I have chosen these two cities to conduct a cross-cultural comparison of wireless technology. Both cities are also adjusting their economies with the changes in current times. Therefore, by using two cities that promotes higher education to the fullest extent and is leading changes in their economy in their respective countries, I plan to test the following hypotheses:

H_1: The use of wireless technology at the university in Pittsburgh is greater than the use of wireless technology in the Roman university.

H_2: The wireless technology used at the university in Pittsburgh is more advanced than the wireless technology in the Roman university.

H_3: Based upon security levels, the administration of wireless technology is more advanced at the university in Pittsburgh than in the Roman university.

Methodology

To study the proposed hypotheses, surveys were administered in Rome and Pittsburgh to students randomly selected at The American University of Rome (AUR) and Robert Morris University (RMU) in Pittsburgh (see Appendix). By surveying the students, evaluations were

made regarding areas for further research and how students will use the wireless technologies in their upcoming professional careers. At AUR their average enrollment is 515 students (AUR, 2006). At RMU they enroll approximately 5,000 students (RMU, 2006). Students at both universities were surveyed in similar settings in an attempt to keep the administration process and the answer process as consistent as possible. Both settings were student congregational areas. At AUR, students were surveyed in the Garden outside the main entrances to the classroom buildings where tables and chairs were located for students to sit between classes. At RMU, students were surveyed in the Cafeteria, which is also a major congregational area for students between classes.

The survey questions are phrased to address the proposed hypotheses and are all closed-ended. There are questions regarding how often students use wireless technology and for what purposes they use this technology. These questions helped answer which culture uses wireless technology more often and helped to evaluate and discuss the roles wireless technology plays in both cultures. Other questions focused on the different types of wireless technology used in both cities; which helped determine which culture has more advanced wireless technologies based on the perceptions of the users. The final questions addressed the security students must pass through to connect to a wireless network. The questions regarding security helped to answer which city has a higher and more focused administration level, based on security, to help discuss different styles of administration techniques for security.

Findings

The findings from the surveys administered at AUR and RMU are discussed and displayed in the following tables under the appropriate Hypothesis and its corresponding question on the survey administered to the students. Twenty-one wireless users completed

surveys at AUR and forty RMU wireless users completed surveys. Since the two universities do not have similar sample and population sizes, exact numbers are not compared; instead, percentages are used more often to compare the two universities.

H_1: The use of wireless technology at the university in Pittsburgh is greater than the use of wireless technology in the Roman university.

1. Have you used this campuses wireless network before?

University	Wireless Users	% of Total Enrollment
RMU	40	.8%
AUR	21	4%

2. How often do you use the campuses wireless network?

RMU:

Usage per Month	2 Times per Month	4 Times per Month	More than 6 Times per Month
% of Users	25%	30%	45%
Connections per Month	20	48	108

AUR:

Usage per Month	2 Times per Month	4 Times per Month	More than 6 Times per Month
% of Users	43%	33%	24%
Connections per Month	18	28	30

At AUR, the 21 students surveyed translate to .041, or about 4% of the AUR student population (AUR, 2005). There were 40 students surveyed at RMU and this translates to .008, or about .8% of the student population at RMU (RMU, 2006). From the 40 RMU users surveyed, at least 176 connections per month were made to RMU's wireless network. This is approximately 4.4 connections per month per person. Of the users surveyed at AUR,

at least 76 connections were made per month. This translates to fewer connections per person per month, at 3.6 connections per month. Also of notable interest is a trend of use, which increases per user by connections in Pittsburgh; the trend works inversely in Rome, connections go down per month but the number of users go up.

- The wireless technology usage at RMU in Pittsburgh has been found to be greater than the use of wireless technology at AUR in Rome.

H_2: The wireless technology used at the university in Pittsburgh is more advanced than the wireless technology in the Roman university.

3. Have you used a wireless laptop to connect to this campuses wireless network before?

University	# of Users that used a Laptop	% of Users that used a Laptop
RMU	39	98%
AUR	21	100%

4. Have you ever used another wireless device, not a laptop, to connect to this campuses wireless network before?

University	# of Users that used a device besides a Laptop	% of Users that used a device besides a Laptop
RMU	14	35%
AUR	5	24%

5. Brand new, what year would you say the wireless device you used on this campuses wireless network would be? (If multiple devices have been used, circle multiple years)

RMU:

Year Devices were Made	Pre-2000	2000	2001	2002	2003	2004	2005	2006
Users	0	0	0	0	17	11	16	13
% of devices	0	0	0	0	30%	19%	28%	23%

AUR:

Year Devices were Made	Pre-2000	2000	2001	2002	2003	2004	2005	2006
Users	0	0	1	0	1	7	10	6
% of devices	0	0	4%	0	4%	28%	40%	24%

From Question Three, almost all users at RMU have used a laptop to connect to the wireless network, or 39/40 users. At AUR, all users used a laptop to connect to the wireless network, or 21/21 users. The results from Question Four show that 35% of the users at RMU and 24% of the users at AUR used another device to connect to the wireless network besides a laptop. These are both highly significant numbers. Based on the findings from Question Five, which asks for the model year of the technology a user uses, there is not much difference between the user's technology at RMU and at AUR. With both universities, all the wireless technology was manufactured between 2003 and 2006, except for one device at AUR made in 2001.

- It is undeterminable if the wireless technology used at RMU in Pittsburgh is more advanced than the wireless technology used at AUR in Rome.

H_3: Based upon security levels, the administration of wireless technology is more advanced at the university in Pittsburgh than in the Roman university.

6. When connecting to this campuses wireless network, have you been asked to enter a WEP Key (password) to connect?

RMU:

Experience's of Users to enter WEP Key	Yes	No
# of Users	4	37
% of Users	10%	93%

AUR:

Experience's of Users to enter WEP Key	Yes	No
# of Users	8	13
% of Users	38%	62%

7. Once connected to this campuses wireless network AND you had to enter a WEP Key (password), were you given access to internal services (printers, network files, etc.)?

RMU:

Access to Internal Services needing a WEP key	Yes	No
# of Users	4	0
% of Users	100%	0%

AUR:

Access to Internal Services needing a WEP key	Yes	No
# of Users	2	6
% of Users	25%	46%

8. Once connected to this campuses wireless network BUT you did not have to enter a WEP Key (password), were you given access to internal services (printers, network files, etc.)?

RMU:

Access to Internal Services not needing a WEP key	Yes	No
# of Users	0	38
% of Users	0%	100%

AUR:

Access to Internal Services not needing a WEP key	Yes	No
# of Users	3	13
% of Users	19%	81%

From an answer of 'Yes' in Question Six, Question Seven reveals that all four users at RMU were given access to internal services, such as printing and network files after entering a WEP key. This is much unlike AUR where the users who stated that they experienced the need to enter a WEP key, did not receive internal services. With an answer of 'No' in Question Six, Question Eight reveals that when users from both RMU and AUR did not have to enter a WEP key, neither university offered internal services.

- Based upon security levels, the administration of wireless technology is more advanced at RMU in Pittsburgh than at AUR in Rome.

Implications

With the increase of wireless devices and technology, the use of this technology is expanding as would be expected. Therefore, the rate at which it grows and the benefits of this technology are of considerable importance because it helps to gauge the importance each culture places on wireless technology. By studying the importance a particular culture places on wireless technology, we can make more intelligent social, economical, and business decisions. This study examined hypotheses regarding the importance of wireless technology and presents a basis for future research.

One notable limitation in this study was the size of each population. To receive more information from students at both universities regarding their wireless networking habits and experiences would be more beneficial and more exact because a larger number would be presented.

In reference to H_1, RMU's wireless technology usage was found to be greater than the average usage at AUR. Connections per user per month were more than triple the number in Pittsburgh than in Rome. Also found was an inverse relationship between RMU and AUR

regarding how many times a user connects to the campus' wireless network per month. Most RMU students tended to connect more often per month, while most AUR students choose to connect only a couple times per month rather than many. Further research is needed to help determine if these numbers are consistent. Further research should also answer why this inverse relationship occurs and to possibly ask if there are cultural influences regarding the specific reasons students choose to connect wirelessly to their campus' network.

Regarding H_2, it was undeterminable which university used a more advanced wireless technology. Students at both universities used devices that were all made around the same time, 2003-2006. Within these three years, there is not a drastic difference in the technology. This similarity in technology could be because at AUR, some students surveyed were Study Abroad students from the United States. Value would be placed on further research in order to confirm these numbers. Also, further research into the backend of the wireless networks, such as the types of switches, AP's, and the software involved with the wireless technology would really help to place an emphasis on which culture is more advanced; this done while delving deeper into the specifics of users' devices as well. What is of particular note and would require further research are the findings regarding other wireless devices used along with laptops. RMU boasted 11% more users who used wireless devices that were not laptops on their campus' respective wireless network. Further research needs to determine if this number is consistent and if cultural values places an emphasis on the need to be connected or simply financial constraints do, or a combination of both.

In H_3, administration of wireless networks, based upon security levels, were found to be more advanced at RMU than at AUR. This was determined because users who entered WEP keys were given internal services at RMU. Not only does RMU restrict qualified users to a

particular segment of the network or a virtual local area network (VLAN), but they are given special access rights when entering a WEP key (W.J. Fuoco- RMU Wireless Administrator Summer 2006, personal communication). However, users at AUR who entered WEP keys did not have this privilege. Both universities did not give out internal services when users did not have to enter the WEP keys. Further research would be advocated to determine how restrictive RMU is regarding who obtained access and why. Coinciding research is needed to determine if AUR has the capabilities and/or the knowledge on how to administer these external services wirelessly.

This study supported H_1 and H_3, finding that RMU students use their wireless network more often than do AUR students and RMU is more advanced in administering their wireless network. Support of H_2 was undeterminable and requires more research to answer the question of which university has more advanced wireless technologies. However, further research has been suggested for all three hypotheses. Because of the limitation of small population sizes, more accurate information can be found with further research. This further research can also help determine, with more certainty, the importance wireless technology has on each culture.

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Appendix

W. Joshua Fuoco
Robert Morris University
International Honors Thesis Survey: Wireless Technology

Circle Each Answer:

1. Have you used this campuses wireless network before?

   Y N

2. How often do you use the campuses wireless network?

   2 times per month 4 times per month more than 6 times per month

3. Have you used a wireless laptop to connect to this campuses wireless network before?

   Y N

4. Have you ever used another wireless device, not a laptop, to connect to this campuses wireless network before?

   Y N

5. Brand new, what year would you say the wireless device you used on this campuses wireless network would be? (If multiple devices have been used, circle multiple years)

   Pre-2000 2000 2001 2002 2003 2004 2005 2006

6. When connecting to this campuses wireless network, have you been asked to enter a WEP Key (password) to connect?

   Y (go to # 7) N (go to # 8)

7. Once connected to this campuses wireless network AND you had to enter a WEP Key (password), were you given access to internal services (printers, network files, etc.)?

   Y N

8. Once connected to this campuses wireless network BUT you did not have to enter a WEP Key (password), were you given access to internal services (printers, network files, etc.)?

   Y N