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An Investigation into the use of Multi-biometric Technology for Securing Online Exams in Jamaican Universities: The Perception of Students and Administrators

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Abstract: This study investigated the perception of students and administrators regarding the use of multibiometric technologies to secure online exams. The overall objective of the research was to discover from respondents' their knowledge of biometric technology, their acceptance level and concerns they may have towards using biometric technology. A mixed-method approach was used to conduct this study and a triangulation design was used to compare both the qualitative and quantitative data. One-on-one semi-structured interviews were held with the University Council of Jamaica (UCJ) and University A administrators. Two questionnaires were also used to collect quantitative data from students and administrators, two hundred and five Students and sixty-three administrators from University A and University B completed the research questionnaires. A focus group discussion was also conducted with 13 students from University A who were enrolled as online students. A total of 288 persons participated in the study. The research findings reveal university administrators view the collection of student's biometric data for securing online exams as having beneficial implications for their university and it could possibly help to improve their university distance learning programme's integrity. The findings also reveal that students had mixed reactions towards giving their biometric data to their university for online exam authentication. Students were aware of the benefits of using biometric technologies and do appreciate the reasons for such implementation such as being able to uniquely identify students. However, the majority of the students reported that they have concerns about the privacy of their biometric data. They have concerns about how their biometric data will be stored, protected and used if they were asked to provide such information by their university. The accreditation body UCJ highlighted similar concerns about the storage and protection of student's biometric data; they believe the government of Jamaica can develop laws to address student data protection in an educational environment where biometric technology could be utilized. The findings of the qualitative and quantitative data reveal that fingerprint technology was the preferred biometric authentication technology students were willing to provide and administrators believe fingerprint and facial recognition is the most appropriate biometric characteristic to accept from students. The research study concludes by offering implications for higher education institution, conclusion and future research.

Keywords: Multi-biometric, Authentication, Technology, Online, Fingerprint, Voice Recognition, Iris Scan, Facial Recognition, Typing Pattern

I. Introduction

Universities in Jamaica are moving to distance education by offering fully online courses of study, with some or all exams being conducted online. How does an instructor teaching online know who is really behind the screen taking quizzes and exams? Are there ways of identifying and authenticating students thereby reducing instructor anxiety? These questions are typical of security questions asked in society at large. Unfortunately, although technological approaches to security have become increasingly sophisticated, human weaknesses still continue. The University Council of Jamaica (UCJ) has seen the increase in online programs being offered by overseas universities, which has led the accreditation body to publish a set of standards for distance education, with requirements for online exams (UCJ, 2015). Preliminary talks with the accreditation body and an interview carried out by a Jamaican Information Service (JIS) reporter Elaine Reckford in 2013 with UCJ about their distance learning standards reveal that the body is concerned about the integrity of such programs. Dr. Yvonne Marshall, past executive director of the UCJ, stated: "The review came about as a result of increasing concerns about the quality of some online programmes currently being offered and whether they are comparable in standards to those offered in the conventional face-to-face setting". The implication is unless these standards are adhered to; these online programmes of study may not be eligible for accreditation. To meet these standards, Jamaican higher education institutions and overseas institutions operating locally will have to prove to UCJ that the student receiving qualifications, after completing their different courses of study, is the actual student that has completed all online assessments. One of the areas of focus will be the examination of the technology, software and authentication methods used by these universities to uniquely identify and verify students in the virtual space. Universities will now have to look at ways to ensure the integrity of online activity and online exams in their distance learning programs, and biometric authentication technologies may play a key role. How do university administrators and students view such authentication technology in an academic environment? Will students be willing to give their biometric data? And what biometric data will they be willing to give? What are students' concerns regarding implementation of this technology? Of equal importance is the question regarding the willingness of university administrators to acquire student's biometric data? Do these universities have the infrastructure in place to secure and protect such data? Previous research has identified user concerns about biometric authentication technology, but most of this research has been conducted in the European and North American

contexts. Scientific data on the perception of biometric technology to secure online exams is woefully lacking in the context of Jamaica and the Caribbean. Empirical research and scientific analysis are required to support the formulation of credible policies and development of effective security measures in order to address concerns about student's privacy, biometric data storage and any cyber-attacks that may compromise this data.

Conclusion

The process of conducting this timely research and writing about such an important, relevant, and well-received topic was a humbling experience. The research participants openly engaged in, contributed to, and partnered in this process. The data collection period was an artistic experience of intuitive listening and capturing stories. This mixed methods study was artfully designed and executed using each phase of the research to enhance and build upon each other. The findings were richer, more robust, and more real because of the mixed methods nature of the process and sequential research design. Ultimately the study revealed that administrators view the collection of student's biometric data for securing online exams as having beneficial implications for their university and it would help to improve their university distance learning programme's integrity. However the accreditation body UCJ feels that the burden of proof will have to be proven to them by the university that it does indeed improve the integrity. Students had a mixed attitude towards giving their biometric data to the University for Online Exam Authentication. Both the qualitative and quantitative findings reveal that while students see the benefit of such a technology. Nonetheless, they are concerned about how the data will be stored, protected and used if they were asked to provide it. Similarly, the findings of the qualitative and quantitative methods reveal that fingerprint technology and facial recognition followed by voice recognition was the preferred biometric authentication technology students were willing to provide and administrators believed that fingerprint and facial recognition is the most appropriate biometric characteristic to accept from students. Overall the results of this survey suggest that participants have a positive attitude towards the use of multi-biometric systems for securing online exams. However, this investigation also revealed that students and administrators from University A and University B have genuine concerns about biometric authentication technology. Chief among barriers to the acceptance of biometrics are concerns about the security of biometric information majority of the students expressed they do not believe their university is adequately equipped to protect their data. Students have privacy concerns when it comes to giving their biometric data to their university, while administrators express concerns about student's privacy when collecting their biometric data to secure online exams. This will prove to be a hurdle for institutions implementing multi-biometric technology, as privacy and data security issues are 'back end' properties of a system that users are not aware of. It will be difficult for them to convey to users their data storage or privacy policies through the design of a biometrics user interface, so this would be an undertaking to overcome. As such UCJ has recommended that the government of Jamaica should develop laws to address student data protection in the education environment and give the agency policies that will help them govern higher education institutions using biometric technology. With these laws in place students may have a sense of protection as institutions will be held

accountable by the government to secure and protect student's biometric data at all cost. This study is significant as it adds value in identifying students and administrators perceptions toward implementing biometric authentication technologies into distance learning programmes in higher education institutions. This is a new paradigm in the Caribbean and more so in the Jamaican context. Applying such technology to reduce academic dishonesty is more than a theoretical concept. Institutions are conducting and in some cases actively implementing distance learning programmes. These and future adoptions of biometric authentication technology could be used to improve these programmes by designing a rounded approach to support biometric authentication solutions across the academic environment. The University Council of Jamaica contends that this research is timely and can help to start the discussion on authentication technologies within higher education, government and the accreditation body. The researcher hopes this study will initiate this discussion to make that holistic approach of using multi-biometric authentication technologies in distance learning programmes in Jamaica a reality. That student, academic institutions, government and the accreditation body would be satisfied and have confidence with.

References

- Benyon, D., Riley, C., Buckner, K. & Johnson, G. (2009) *Culture & Biometrics: Regional Differences in the Perception of Biometric Authentication Technologies*. Retrieved on March 10, 2017, from https://www.researchgate.net/publication/220414954_Culture_biometrics_Regional_differences_in_the_perception_of_biometric_authentication_technologies
- Babbie, E. (2007). *The practice of social research* (11th Ed.). Belmont, CA: Thomas Wadsworth Berg, L., (2009) *Qualitative Research Methods for the Social Sciences*. Seventh Edition. Boston MA: Pearson Education Inc.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.
- Cresswell, J. W., & Plano Clark, V. L. (2007) *Designing and conducting mixed-methods research*. Thousand Oaks, CA: Sage Publication, Inc. Curlette, W. (2006) A framework for research studies: Mixed methods through combining Bayesian statistics and qualitative research in individual psychology. *The Journal of Individual Psychology*, 62(3), 338-349
- Fink, E. (2001). *Developing principals as instructional leaders*. Phi Delta Kappan, 82(8), 67-72.
- Frankfort-Nachmias, C., & Nachmias, D. (2007). *Research methods in the social sciences*. New York, NY: Worth.
- Franklin, I. (2012). *Understanding Research: Coping with the Quantitative-Qualitative Divide*. London and New York: Routledge
- Students and Administrators Perception of Multi-biometric Technology 195 Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction*. Boston, MA: Allyn & Bacon

Gay, L. R., & Airasian, P. (2003). *Educational research: Competencies for analysis and applications*. Upper Saddle River, NJ: Merrill

Guillén-Gámez, D., García-Magariño, I., and Romero, J. (2015) *Analysis of the Perception of Students about Biometric Identification*. Retrieved April 23, 2017, from <https://www.igiglobal.com/article/analysis-of-the-perception-of-students-about-biometric-identification/126930>

Hadi, F., Ullah, A., Haris, M., & Shah, Y. (2016). Student Perception about the Use of Biometrics Technologies in an Academic Environment of Abdul Wali Khan University Mardan Pakistan. *International Journal of Advanced Studies in Computers, Science and Engineering*. Retrieved on March 2, 2017, from <http://search.proquest.com/openview/e601d6a2a01d787267c87e64c00af2f5/1?pqorigsite=scholar&cbl=2028729>

Krupp, A., Rathgeb, C., & Busch, C. (2013, October 3). *Social Acceptance of Biometric Technologies in Germany: A Survey*. Retrieved June 13, 2017, from <http://ieeexplore.ieee.org/document/6617157/>

Krueger, A. (2002). *Thoughts: What we know about science teaching and learning*. Aurora, CO: Mid-continent Research for Education & Learning

Levy, Y., Ramim, M., Furnell, M., & Clarke, N. (2011) *"Comparing Intentions to use University Provided vs. Vendor Provided Multi-biometric Authentication in Online Exams"*, Retrieved on March 1, 2017, from <http://dx.doi.org/10.1108/10650741111117806>

Students and Administrators Perception of Multi-biometric Technology Mertler, C. A., & Charles, C. M. (2008). *Introduction to educational research*. Boston, MA:

Allyn & Bacon Mohammad, S. and Mohammed I (2013) *Challenges of Online Exam, Performances and problems for Online University Exam* Retrieved on April 24, 2017, from <http://www.ijcsi.org/papers/IJCSI-10-1-1-439-443.pdf>

Pullet, K., Morris, M. and Douglas, D. (2014) *Verifying User Identities In Distance Learning Courses: Do We Know Who Is Sitting And Submitting Behind The Screen?* Retrieved on April 10, 2017, from http://www.calu.edu/academics/colleges/eberly/business/economics/working-paper-series/_files/Adnan1.pdf

Pons, P. and Polack, P. (2008) *Understanding user perspectives on biometric technology* Retrieved April 23, 2017, from <https://cacm.acm.org/magazines/2008/9/5309-understanding-user-perspectives-on-biometric-technology/abstract>

Ramim, M. and Levy, Y. (2007) *Towards a Framework of Biometric Exam Authentication in ELearning Environments*

Retrieved on April 25, 2017, from <http://www.irmainternational.org/viewtitle/33131/>

Ramu, T. and Arivoli, T. (2013) *A Framework of Secure Biometric Based Online Exam Authentication: An Alternative to Traditional Exam*. Retrieved on April 23, 2017, from Silverman, D., (2011). *Qualitative Research: Issues of Theory, Method and Practice*, Third Edition. London, Thousand Oaks, New Delhi, Singapore: Sage Publications

Steward, A. J., & Shields, S. A. (2001). Gatekeepers and change agents. In D. L. Tolman & M. Brydon-Miller (Eds.), *From subjects to subjectivities* (pp. 304-318). New York: NY: University Press Trochim, W. M. K., & Donnelly, J. P. (2007). *The research methods knowledge base*. Mason, OH: Thomson

Wong, L. P. (2008). *"Data Analysis in Qualitative Research: a Brief Guide to Using Nvivo."* Malaysian Family Physician 3(1)